

13

THE
DIARY COMPANION;
BEING A
SUPPLEMENT
TO THE
LADIES' DIARY,
FOR THE YEAR 1800.

Containing Answers to the last Year's ENIGMAS,
REBUSES, CHARADES, QUERIES, and QUES-
TIONS; both in the DIARY and SUPPLEMENT.

With some New ENIGMAS, REBUSES, CHARADES,
QUERIES, and QUESTIONS, proposed to be an-
swered next Year.

Also, CALCULATIONS of the ECLIPSES; and other
New Discoveries in the Heavens.

By the DIARY AUTHOR.

LONDON:

Printed by W. GLENDINNING, No. 25,
HATTON-GARDEN;

For G. G. and J. ROBINSON,
Paternoster-row.

[PRICE TWELVE-PENCE, STITCHED.]

SUPPLEMENT
TO THE
LADIES' DIARY,
FOR THE YEAR 1800.

ANSWERS TO THE ENIGMAS.

<i>In the Diary.</i>		<i>In the Supplement.</i>	
1 Innocence	6 Enigma	1 Fancy	5 Egg
2 Blush	7 Time	2 Darkness	6 Aurora Bore-
3 Dipthong	8 E	3 Map	alis
4 Hope	9 Bone	4 Apothecary's	7 or Pr. Bed.
5 Lock	10 or Pr. Fan-	Shop	
	cy.		

Other Answers to the Diary Prize Enigma, beside those inserted in the Diary, are as below :

12. *The Independent Countryman : by B. Neoforensis.*

My cottage is plac'd at the foot of a hill,
Where I pleasantly pass away time :
Not caring for Jack, nor for Tom, nor for Will,
While they jar not with me nor with mine.

I'm happy and chearful at work or at play,
Contented I lie down at night;

My *Fancy* as light and as lively as May,
And I care not who comes in my sight.

13. *The Same: by Mr. Thomas Coulson, of Boltshurn.*

Give me a heart whose thoughts are clear,
From fraud, disguise and guile ;
I'll neither Johnson's frownings fear,
Nor court a Coultherd's smile.

The greatness that would make me grave ;
Is but an empty thing ;

Let me but wit and *Fancy* have,
I'll envy not a king.

14. *The Same: by A. G.*

Ye giddy Fair, of various charms possess'd,
Reflect—invite sweet *Fancy* for your guest :
How rich her stores in Seraphina's breast.

15. *The Same: by Mr. A. Glendinning, Royal Navy.*

All hail, ye learn'd Diarians Fair, all hail !
Whose bland Imaginations dare assail
Parnassus' height, in *Fancy's* vagrant sheen ;
While sov'reign reason steers the bold machine.

No. 13. Diary Prize Enig. answered. 3

16. *The Same: by Mr. W. Buttermann, of North Cove.*

One ev'ning in winter being set by the fire;
An old friend made his entry, and thus did inquire:
"Have you seen Lady Di? Madam Fortune's been kind,
Tho' you always accounted the goddess as blind."
Madam Fortune! I beg Sir you'll please to explain;
I'm a stranger intire unto the old dame:
Perhaps it's Miss Fortune, her daughter, you mean,
That often in life's rugged paths I have seen.—
He reply'd, "Read but the last page of the Diary,
You find out my *Fancy* without more enquiry.

17. *The Same: by Mrs. Blanch Lean, near Penzance.*

Once more the muse awakes, and strikes the string,
And on * *Imagination's* sportive wing, * or *Fancy*.
Fain would she in Diaria's praises sing.

18. *To Mr. John Field, in Answer to Emma's Wish: by Louisa.*

Since Emma's made the sport of thy rude lines,
To take her part the youthful muse inclines.
One year's too short the memory to efface,
Of thy attempt fair Emma to disgrace.
But thy poor *Fancy*, youth, can ne'er succeed,
To injure those that nature ought to lead
You to protect from injury and wrong.—
Take then this hint, and I'll conclude my song.

19. *The Same: by Miss Eliza Still.*

I really was puzzled, when reading the prize:
Is it *Fancy*, said I, Mr. Smart has disguis'd!
Is it Judgment, or thought—or what else can it be?
Why really, so nearly allied are the three,
I can't fix what it is—yet still do believe
It is one or the other—or I am deceived.

20. *Address to Miss Maria Middleton: by Miss Eliza Wright.*

Come, Middleton, resign all trifling things,
For those sublimer joys reflection brings;
To calm pursuits of thought let us repair,
Wisdom converses with her children there.
The flights of *Fancy*, and its wild extremes,
The heights of fiction, and its airy dreams;
From sounds to substance, let us now retreat,
To human nature, to that genial heat,
That noble warmth, those soft recesses scan,
That noble, generous part, the mind of man,
From whence his private, public blessings flow,
His home-felt joys, experienc'd here below.

4 Diary Supplement, 1800.

21. *Address to Mr. Smart: by Mr. G. Young, Spalding.*
 My sleepy muse is hov'ring o'er its * *Bed*, * *Sup. Pr.*
 Whilst thine to bright ethereal realms is fled;
 And on fame's tow'ring wing shall higher rise,
 Since Hutton deems your *Fancy* worth the prize.

GENERAL ANSWERS TO THE DIARY ENIGMAS.

14. *By B. Neoforensis.*

By the <i>Eyes</i> of my Lucy I swear;	8
By the <i>Innocent Blush</i> on her cheek,	1, 2
By the <i>Locks</i> of her jetty black hair;	5
By the charms from her head to her feet;	3
I will make her the Bone of my <i>Bone</i> ;	9
No <i>Time</i> shall my <i>Fancy</i> remove;	7, 10
In a whisper <i>Hope</i> says she's your own;	4
O what a sweet <i>Riddle</i> is love.	6

15. *Address to Mrs. Richardson: by Miss Sarah Porritt.*

Has <i>Time</i> , Eliza, murdered all our love;	7, 8
Must I ne'er <i>Hope</i> to see thy face again;	3, 4
Shall we ne'er meet in this our fav'rite grove,	
Where <i>spotless</i> pleasures ever, ever reign.	1
Lo, when bright Phæbus darts his scorching ray,	
Quickly I seek the rosy <i>Blushing</i> bow'r,	2
Far from domestic cares, I thither stray,	
And for reflection steal a secret hour.	
View the gay scene by lovely nature wrought,	
Till dear remembrance o'er my <i>Fancy</i> roll,	10
How either youthful <i>Bosom</i> once was fraught	9
With love sincere, and sympathy of soul.	
But friendship's sweets, like other flowers fade,	
Like other fleeting toys fond man adores;	
False happiness unlocks her transient shade,	5
And the <i>delusive</i> visions are no more.	6
Is life's best pleasures but a golden dream?	
Dear long-lost friend awake thy tuneful lyre;	
Make the much-lov'd goddess still thy theme;	
Say—can a pure genuine flame expire.	

16. *Ode to Nothing: by Mr. Rob. Sanderson.*

Hail! airy phantom! with thy motley mein,	
Thou various-mansion'd doughty hero, hail,	3
Who now skim'st, like a fairy, o'er the green,	
Now stalk'st, with saucer <i>Eyes</i> , along the vale.	8

No. 13. Diary Enigmas answered. 5

Who visitest (a frightful ghost!) that place
 Where rest, all levell'd low, the silent dead,
 Or shew'st, with smile malicious, thy face,
 In poet's pocket, or in Floria's head.
 Thro' thee, great nations cannot be at rest,
 Embattled armies murder, for thy name;
 Thro' thee, such fears arise in Clodpate's breast,
 As chill the heart, and quite unnerve his frame.
 But must thy wide dominion never cease?
 Can't (as she traverses the lonely mile)
 E'en blooming *Innocence*, once *Hope* for peace? 1, 4
 But trembling view thee, on each tree and style.
 Must the fair crowd, where wit and *Fancy* rule, 10
 Who feel for *Dia's secrets*, fond desire, 6
 Seeing thee, sideways, on each chair and stool,
 Creep, for protection, closer to the fire?
 Must tatter'd pen'ry (driven to *Gripus gate* lock 5
 By the loud impulse of all-powerful need,)
 Long *Time* in trembling expectation wait, 7
 And get but thee at last, her child to feed?
 Must giant wealth, of insolence the haunt,
 (Thou his chief motive) at each public place,
 Unwhipt, call forth, with spiteful jear and taunt,
 The *Blush* indignant, into merit's face? 2
 Fir'd by this thought, the theme, my muse must spurn,
 And tho' too chaste to vent *one* single curse, B 9
 Yet angrily, she bids thee quick return
 To thy old much-lov'd cell—my shabby purse.
 17. *Elegy on a Miser: by Mr. John Smith, Alton Park.*
 Ye *Blushing* roses that the air perfume, 2
 And all around your fragrant odours shed,
 Recline your heads, resign your wonted bloom, 3
 And fade away, for, ah! *Avaro's* dead.
 He's gone, alas! gone to return no more!
 'The debt of nature, 'gainst his will, he's paid,
 And (tort'ring thought!) he's left his "favourite ore,"
 And in the gloomy grave his *Bones* are laid. 9
 To him were known the joys that precious gold
 Can yield; (for of much wealth he was possess:)
 How would it please his *Fancy* to behold
 His shining heaps when he unlock'd his chest! 5
 Some sneaking *virtues* in him clearly shone, 1
 A sober and abstemious life he led;
 His belly he would seldom fill, 'twas known,
 Unless he at another's table fed.

6 Diary Supplement, 1800.

If the distressed hapless child of want,
Or wrinkled age, worn out with grief and care,
Approach'd his gate, to crave a pittance scant,
It rais'd his pity, but he'd nought to spare.

No thoughts on marriage *E'er* disturb'd his brain,
And all his days he led a single life ;
He knew 'twould waste his treasure to maintain
A train of children and a dainty wife.

His mind to mirth and *Fancy* he ne'er gave ;
His *Time* he ne'er was known to waste, like some ;
Whole days and nights he *manfully* would slave,
In *Hopes* that he should soon acquire a plum.

But, ah ! alas ! he's left his fav'rite hoard ;
Unwillingly he has resign'd his breath ;
The glittering treasure which his soul ador'd,
Could not avert the fatal stroke of death.

18. *Address to Old Diarians : by Mr. Tho. Truswell, Nuneaton.*

Dear ladies I hope you'll permit me once more,
To try if I can your enigmas explore ;
Thro' Smart's invitation, and others, again
I have ventur'd to range the scientific plain :
Tho' weak all my efforts, dear ladies excuse
My dull imperfections, and dissonant muse ;
For know, if the axe should once strike at the root,
It weakens the blossoms, and deadens the fruit ;
Then perish the branches, that blossom'd so soon,
And frigid December is blended with June.—
How happy am I, now Narcissa appears,
Who waited upon you for numbers of years :
Her strains how harmonious, witty and fine,
And elegant diction appear'd in each line :
Go on dearest madam, my thanks are your due,
I am happy in such a companion as you.—
But what are become of the rest of the train,
Who formerly grac'd Lady Dias domain ;
I am fearful, alas ! that the cold hand of death,
Has snatch'd away from them their sweet vital breath :
If so, we'er depriv'd of their learned productions,
Their pleasing enigmas, equations and fluxions.
But I hope some remain, who will deign yet to try,
To find out the values of *x* and of *y*.
'Tis harmless amusement, how hard be the task,
'Tis pleasing, dear ladies, to solve what you ask.—
See Anderson first on the carpet appears,
With *Innocent* features each bosom he cheers.

No. 13. Diary Enigmas answered. 7

Next Bayley comes forth, the gay spring to disclose,
 And presents the young fair with the *Blush* of the rose. 2
 Then Clark, with his *Diphthongs*, appears to your view; 3
 And Coulson's best *Hopes* are attendant on you. 4
 Mr. Fildes and I, we could scarcely agree,
 When no *Locks*, teeth or nose, could I certainly see. 5
 J. H's *Enigma*, itself will explain; 6
 And Holliday's *Time* will for ever remain. 7
 Mr. Maupre has duly *Embellish'd* each line; 8
 And Middleton's *Bone* doth resplendently shine; 9
 While Smart, with his *Fancy*, so ardent doth fire 10
 The breast of each swain with a pleasing desire;
 And also each fair one, whose lines do appear,
 To grace Dia's pages, each plentiful year.

19. *The Choice determined in the Family of Di: by Mr. Gilbert Young, Spalding.*

'Mongst virtue's fair daughters I sought me a bride;
 Had access to them all;—none here are denied;
 By many they're courted; adher'd to by few;
 Cease, cease your surprize till they pass in review.

Miss Charity's fond,—won't to one be confin'd,
 And Justice severe, as a mill horse is blind;
 While *Hope*, cripple like, keeps an anchor to rest on, 4
 Supporting dull Patience to carry the jest on.

Poor credulous Faith believes in strange *Fancy's*, 10
 Nor *Locks* up her ears 'gainst what *Diphthong* advances; 5, 3
 But *Innocence*—ps ha!—recollect Eden's garden— 1, 8
 The hint's *Enigmatic*, for which I beg pardon.

Miss Chastity's next, and a maiden complete;
 But so shy, that a word calls a *Blush* to her cheek; 2
 And niggardly Prudence, whom many approve,
 No *Time* will devote to the toyings of love. 7

Thus the vices begin where the virtues do end,
 Hence virtue and vice we see frequently blend;
 But Di has a daughter, If I can come at her,
 Possesses the first, and is free from the latter.

Her name I point out, that it may'nt be mistaken;
 'Tis neither Narcissa, Fox, A. T, nor Maken;
 Tho' these shine in mérit,—allow it you will;
 But the fair I'd make "*Bone* of my Bone," is Miss Still. 9

She's lovely, she's witty, she's pretty, she's true;
 She is all I can wish,—What more pray wish you?
 Depend she that, tho' it may be unsung
 By her servant devoted and humble, G. Young.

8 Diary Supplement, 1800.

ANSWERS TO THE SUPPLEMENT PRIZE ENIGMA.

1. *Eprigram: by Mr. Geo. Boulby, of Acworth.*
 Cries Ned, to his neighbours, as onward they press'd,
 Conveying his wife to her *Bed* of long rest;
 Take, friends, I beseech you, a little more leisure;
 For why should we thus make a toil of a pleasure.

2. *The same: by Mrs. Eliza. Brown, of Surfleet.*
 I sat myself down to con o'er your prize,
 Serene was the weather, and clear was the skies,
 Fain would I explore what so puzzled my head,
 But could not succeed till retired to my *Bed*.

3. *The same: by Mr. B. Cleypole, London.*
 When Sol withdraws his all-enliv'ning ray,
 And night's dark curtain closes in the day;
 Shou'd Morpheus wave his pow'rful wand of lead,
 The busy world for rest retire to *Bed*.

4. *The same: by Mr. Tho. Coulson, Boltsburn.*
 Refresh'd with calm and sweet repose;
 Each morn I from my *Bed* do rise;
 Then first I do in pray'r disclose
 My thoughts to God all just and wise.
 Cheer'd with the lark's shrill morning lay,
 I often range around the fields,
 And as I walk I think and pray,
 What satisfaction study yields.

5. *The Invitation: by Mrs. Furnass, of Heddon-on-the-Wall.*
 Come, gentle sleep, come, close my wakeful eye
 In peaceful slumber, on the silent *Bed*;
 For now night's lamp reflects a feeble ray,
 And each diminish'd star withdraws its head.

6. *On Winter: by Mr. Rd. Humber, Brighton.*
 Stern winter now assails the plains,
 The rivers bound in icy chains;
 All nature feels the chilling blast,
 (Oh! may the boding ill not last.)
 Pity, O pity! the aged poor,
 That shiv'ring wait without your door,
 Send them relief ye rich and wise
 (Lolling on the downy prize)
 Sooth the infant at the breast,
 Let the widow too be blest;
 Catch the orphan's tears that fall,
 Bless the wretched, one and all.

7. *The same: by Mr. David Lewis, Knaresbrough.*
 On *Beds* of down some vainly seek repose;
 While some on straw their heavy eyelids close;

Vo
 Enig
 viz.
 many
 Rev.
 Sam.
 Jack
 John
 Jun.
 Wrig

No. 13. Supp. Prize Enig. answered. 9

Some, rack'd by pain, their nightly vigils keep;
Some with the passions can't attain to sleep;
Some sleeping sound, by honest maxims led;
And some repenting on a dying *Bed*.

8. *Miss Ab. Whil. Maken's address to her Bed.*

Thy comforts still, my *Bed*, I prize,
When ills oppress, or converse cloy;
My wearied hand forsakes the lyre,
And wisdom, books, and music tire;
E'en all the stores of mystic wit
On *Dia's* page, for thee I quit:
While lull'd on thee in sweet repose,
Oblivion cancels all my woes.

9. *The same: by Mr. Wm. Marriott, of Neath.*

How well has Young, that tuneful pleasant bard,
Set forth the various uses of a *Bed*;
May he, when balmy sleep claims his regard,
Feel one, all soft, to rest his weary head.

10. *The same: by Mr. Alex. Rowe, Reginnis.*

"Read but the poet's sweet harmonious theme,
Attend the politician's deep-laid scheme;
These ne'er to full perfection had been brought,
Had *Bed* refus'd its friendly aid to thought."

11. *The same: by Mr. Rob. Sanderson, Steeple Aston.*

The prize I'll develope (one evening I said)
If it force me to scratch all the hair off my head,
But I found it out quickly—by going to *Bed*.

12. *The same: by Mr. John Williamson, Liverpool.*

May Young's admiring works engage
All the friends of *Diary's* page;
And may no sorrows disturb his head,
But always rest with peace in *Bed*.

Various other separate and ingenious answers to the Prize Enigma were also given by the following ladies and gentlemen, viz. John Ashcroft, John Brooksbank, Tho. Bullock, W. Butterman, John Cairns, Geo. Chapman, Tho. Coultherd, T. S. Evans, Rev. J. Exebank, John Fildes, John Featherston, B——d H—n, Sam. Harvey, Jos. Hatfield, Jos. Hindson, Jas. Houlcroft, J. Jackson, Abr. Moore, John Needham, John Parker, Parthenia, John Rimmer, Tho. Rimmer, John Scholfield, Tho. Thorp, Jun. G. H. T, Ja. Thoubren, Wm. Watkins, Jas. Wilson, Eliz. Wright, &c.

GENERAL ANSWERS TO THE SUPPLEMENT ENIGMAS.

1. *By the Rev. Mr. Eubank, of Thornton Steward.*

I *Fancy, Darkness, Map, and Drug,* 1, 2, 3, 4

The first four will unfold;

Then *Egg, with Northern-lights, and Bed,* 5, 6, 7

Subjoin; then all are told.

2. *Anna's Complaint: by Mr. John Fildes, Schoolmaster, Liverpool.*

The solemn bell, within the lofty tower,
 With awful sound proclaim'd the midnight hour;
 The *Northern-lights*, that terror often spread, 6
 Look'd bright, and from their presence *Darkness* fled: 2
 When near the confines of a lonely wood,
 Beneath a *Maple* tree young *Anna* stood. 3
 She, hapless maid, her downy *Bed* declin'd, 7
 To vent her sorrows to the passing wind;
 For *Alfred* lately faithless to her prov'd,
 That swain she almost to distraction lov'd;
 "Dear youth" she cry'd, "thou source of all my woe!
 Must I each pleasing *Fancy*'d bliss forego? 1
 Canst thou forget, when first beneath the shade,
 We vows of lasting love and friendship made?
 With downcast look I frankly their confest,
 Each fond emotion of my virgin breast;
 That I to thee my freedom would resign,
 And seal each vow at *Hymen's* hallow'd shrine.
 Thou begg'dst then kind heaven would bestow 5
 On us that bliss which only lovers know;
 And saidst that thou to me wouldst constant prove
 Till death, and wouldst no other maiden love.
 All this with joy I heard thee oft repeat,
 Nor thought thou could be guilty of deceit.
 Then I imagin'd that each melting kiss,
 Was a sure earnest of our future bliss.
 But now thy absence proves I've been deceiv'd,
 And makes me grieve that ever I believ'd.
 Then quick return, to please my longing sight,
 Thou who art still my heart's supreme delight;
 Come, best belov'd, in every charm array'd,
 And ease the sorrows of a love-sick maid,
 Whom all the pow'r of *Physic* cannot save, 4
 Nor aught but thou, from an untimely grave!"
 Thus did the nymph, with sighs and tears complain,
 Of her inconstant and perfidious swain;
 Then, tender maid, to sad suspense a prey,
 She, quite dejected, homeward bent her way.

3. *The Evening Walk: by Mrs. Furnass, Heddon-on-the-Wall.*

The sun was sinking in the western seas,
 The fanning zephyrs whisper'd through the trees,
 Creations face was clad in lovely hue,
 And blushing honours deck'd the plain anew;
 When out Istepp'd—to give a truce to thought,
 And banish care, which close confine had brought.
 Led on by *Fancy*, soon I gain'd Tyne's bank, 1
 View'd plant and flow'r of various kind and rank;
 Conspiring songsters hail'd the setting hour,
 Wak'd the dull mind, and rous'd its latent power.
 Imagination, did the *Map* comprise, 2
 Plann'd flow'er, beast, bird, and *Egg* of various size; 5
 Here called the *bottle's* aid, and drew and lin'd, 4
 Mark'd waving woods blown gently in the wind:
 The river's murmur'ing streams still led me on,
 Till gath'ring *Darkness* urg'd me to be gone; 2
 Then straight my footsteps measur'd back again,
 Remount the hill—but first traverse the plain.
 Now *streaming* beams dispense their mazy store; 6
 I court my *Bed*—and nature's god adore. 7

4. *Second Thoughts: by Mr. Noah Heath, Sneyd-Green.*

The sun had sunk beneath the crimson west,
 And silent night had lull'd the world to rest;
 The labourer to his *Bed* retir'd again, 7
 And gloomy *Darkness* ruled the wide domain; 2
 Save yonder *Streamers* waving in the sight, 6
 From northern climes reveal a feeble light:
 I left my cot, by contemplation led,
 And cross'd the flow'ry lawn and verdant mead;
 Absorb'd in dark despair, in mind oppress'd,
 While roving *Fancy* fir'd my gloomy breast: 1
 Thro' dreary shades my pathless way I bore,
 Where hollow breezes through the trees did roar;
 My steps directed to a rock, that stood
 Embosom'd in the centre of a wood,
 From whence a stream in murmur'ing accents flow,
 And gently glides to neighbouring vales below.
 Here as I stood, with pensive thoughts oppress'd,
 A sudden voice my wond'ring ear confess'd;
 Hence, fly this place, it said, or seem'd to say,
 Where none but hopeless minds consent to stray;

- By thee, my once lov'd Delia, now am I
Egg'd on to desperate deeds of jealousy: 5
 Farewell ye *Maple* groves, ye streams that flow, 3
 A sudden death shall terminate my woe;
 Farewell all earthly joys, farewell my life,
 This fatal *potion* soon shall end my strife.— 4
 Yet should I yield so mean a death to die,
 And plunge myself in endless misery,
 Before my wav'ring mind my fates ordain,
 Aurora bright had usher'd once again,
 The sun o'er yonder hills new glories bring,
 And plummy choirs make groves and valleys ring.
 So prudently I deem'd it now too late,
 And till some other time deferr'd my fate.

5. *The same: by Mr. Wiles Hostman, near Newcastle.*

- My roving *Fancy* wander'd long, 1
 Among the enigmatic throng,
 Before she could the *Darkness* rend 2
 In which the *pill* and *Egg* were penn'd: 4, 5
 At length I saw the *light* appear, 6
 And then beheld the *Map* quite clear; 3
 Which leaves but one to undisguise,
 Which is a *Bed*, also the prize. 7

6. *To Mr. Woolston, sen. by Mr. Rob. Sanderson.*

Horace, Book 4, Ode 7th, paraphrased.

- Now freed from cov'ring, by the melted snow,
 The trees their leaves, the fields their herbage shew;
 The *Earth* her changes; and, with sober tide, g 5
 The lessen'd rivers in their channels glide.
 Once more, *heav'n canopy'd*, upon the green, 6
 The village dance, of nymphs and swains, is seen.
 —How fickle all things are, alas! full well
 Swift-flying years and rapid minutes tell.
 Returning zephyrs soften winter's blast;
 Next, summer comes, himself not long to last;
 Soon as rich autumn sheds her fruitful store,
 Then lazy winter comes again once more;
 When the quick wasting moons have reach'd their end,
 Their wainings in the friendly skies can mend;
 But we, when once those regions, we explore,
 Where great and good and rich have gone Before, d 7

No. 13. Supp. Enigmas answered. 13

Soon as these clay-built mansions are decayed,
 Become mere dust, and nothing but a *shade*,
 What *Man* can tell us, if to this day's score,
 The fates supreme will kindly add one more.
 Enjoy then virtuous pleasures, while you live,
 (Heirs seldom thank men, for the wealth they give.)
 O Woolston, when among the dead you're mix'd,
 And awful fate your destiny has fix'd,
 Not your son's learning, or your wife's good sense,
 Not your own piety, or eloquence,
 Can e'er arrest the mandate, on its way,
 Or animation give to lifeless clay.—
 Sent to those realms, from which we ne'er return,
 A friend, in vain a living friend must mourn.
 In vain, alas ! young Collin must deplore,
 That fate that bade Maria be no more.

2
p 3

N. B. Enig. 1, is *Fancy*, and Enig. 4, *Apothecary's Shop*.

7. To Mr. T. Woolston, of Adderbury : by Mr. T. R. Smart.

From the rich vales where flows the rapid Soar,
 In circling eddies round her winding shore,
 Thro' meads which gave her Leicestershire to fame,
 While rival countries bow to Bakewell's name,
 'Mid lofty elms, whose tops triumphant rise,
 Enwrapt in mists, and seem to brave the skies,
 The rural muse essays a verse to send,
 Woolston to thee, her fav'rite and her friend.

Of't when the busy day is almost done,
 And sober twilight supersedes the sun,
 Thro' these lov'd walks I stray till *darkness* shrouds
 The last grey tints of eve in sable *clouds* :
 Then present to *imagination's* eye,
 My retrospective pleasures I descry ;
 Retrace with new delight, of late the time,
 I left my cot at Friendship's call sublime,
 Without a *map* to trace the novel road,
 And found your hospitable lov'd abode,
 The wand'ring bard (then stranger) here can boast
 The kind reception of his generous host.
 Tho' spiteful Fortune, envious of my joys,
 Hides me afar from those I chiefly prize,
 Yet soon again I trust the time will prove,
 To see once more the friends I fondly love ;

2
6
1

3

In social converse rove, thro' Cottrel's bow'rs,
By Charwell's banks, o'er *beds* of blooming flow'rs,
Once more to you a friendly visit pay,
And give to mirth the live-long summer's day.

Fir'd at the thought, my muse her theme pursues,
And dwells with rapture on th' enlivening views,
Hails the gay moment in a loftier strain,
Breaths the fond wish, nor may the wish be vain,
Bids Wardley, Sanderson and Woolston join,
Friends in pursuit and followers of the Nine,
While I to meet you fly on Friendship's wings;
To *taste* the pleasure that from Friendship springs;
Emerge from this obscure impris'ning cell,
And tune to sweeter notes the vocal *shell*.

8. *The Beggar's Petition: By Mr. John Smith.*

Ye sons of affluence, who in splendour roll,
And loll supinely on the *bed* of ease,
On one who has drunk deep of misery's bowl,
Bestow a little pittance—if you please.

Pity, oh! pity *my* unhappy fate,
And kindly give a poor old man relief,
Whose tatter'd garb proclaims his wretched state,
Whose falling tears betray his inward grief.

Like you, I once possess'd a plenteous store,
Tho' now, by fate reduc'd to beggary,
And doom'd to crave *support* from door to door;
But why should I repine at Heav'n's decree?

In happier days, when *Boreal* shooting ray
Dispell'd the awful *darkness* of the night,
Oft times, as roving *Fancy* led the way,
To range the meads would give my mind delight.

But now involv'd in poverty and grief,
Those scenes of pleasure will return no more:
O! give a wretched poor old man relief,
And Heav'n will show'r down blessings on your store.

9. *The same: By Mr. Jonathan Walton, Frosterly School*

In Dia's partner, see each page
Replete with learning shine;
Where youths, to grace the future age,
May golden treasures mine.

On every subject she can write,
Make any thing her theme;
A *Map*, an *Egg*, a *Northern light*,
A *Drug*, a *Bed*, a dream.

3, 5, 6
4, 7

No. 13. Rebus. and Charades answered. 15

In light and darkness she can move, 2
 And wheel a mazy round;
 Nay, like *Imagination* rove, 1
 Beyond the farthest bound.

Other general and ingenious answers to the Supplement Enigmas, were also given by the following ladies and gentlemen, viz. John Ashcroft, John Cairns, B. Cleypole, Thomas Coulson, T. S. Evans, B—d H—n, Sam. Harvey, Jos. Hatfield, Tho. Hindmarsh, Jos. Hindson, J. Jackson, Da. Lewis, Wm. Marriott, Abr. Moore, Tho. Nield, Tho. Rimmer, Alex. Rowe, Rusticus, John Savage, John Scholfield, J. Sparrow, Miss A. T, J. J. Thompson, Ja. Thoubren, John Warkman, Wm. Watkins, Jos. Wilson, Eliz. Wright, &c.

REBUSES AND CHARADES ANSWERED.

<i>In the Diary.</i>		<i>In the Supplement.</i>	
<i>Rebuses.</i>	<i>Charades.</i>	<i>Rebuses.</i>	<i>Charades.</i>
1 Woolwich	1 Earthquake	1 Sanderson	1 Sonnet
2 Bayley	2 Something	2 Madam	2 Hatred
3 Babel	3 Carmine	3 May-day	3 Friendship
4 Maken	4 Kid-gloves	4 Revel	4 Ear-ring

DIARY REBUSES AND CHARADES ANSWERED.

11. *Address to Lady Did: By Mr. Rob. Sanderson.*

To pull off each Rebus', and each Charade's cover,
 Dear Dia, once more, pray admit your true lover;
 That he does it with truth, he will lay any stake on,
 See *Woolwich* and *Bayley*, and charming Miss *Maken*.
 But he will not omit quite that foolish old rabble,
 Who build up a *something*, and christened it *Babel*.
 Neat *Kid-gloves* and *Carmine*, and *Earthquake*, all shine,
 (A comical medley) in one single line.
 You'll now plainly see, he's a fellow quite clever;
 And so he concludes, dear madam, your's ever.

12. *The same answered: By Miss Eliza Still.*

At *Woolwich* 'tis known a great author does dwell,
 Who, for science profound, most others excel;
 'Tis the good Doctor Hutton!—But why need I name
 An author that now is so greatly in fame.
 Then *Bayley* comes next, with wit and good sense;
 I wish to his learning I'd half his pretence.
 Then charming Miss *Maken*, that amiable fair,
 And the vain work of *Babel*, the next will appear.
 An *Earthquake* next follows, and *Something* beside,
 I think 'tis *Carmine*, with *Kid-gloves* for the bride.

The same : By Mr. Thomas Truswell, Nuneaton.

Ladies, hail the rosy morning,
 Rise and view the blushing dawn ;
 Phœbus every field's adorning,
 Spreading lustre o'er the lawn ;
 Milkmaids, with their rosy features,
 Trip with smoaking pail along ;
 Nature rouses every creature,
 Skylarks chant their morning song.
 Lips soft smiling, bosoms heaving,
 Tender thoughts possess the mind ;
 Manners sweet and gently pleasing,
 All benevolent and kind.

On the banks the primrose springing,
 Paints a lovely charming scene ;
 O'er the fields the plowboy's singing,
 Lively songs with looks serene.

Happy youth, whose honest calling
 Gains that sweet and homely meal,
 Free from discontent and brawling,
 What sensation must he feel.

Every breeze is music flowing,
 Balmy zephyrs fan the trees ;
 Sweet is every gale that's flowing,
 As the honey-sipping bees.

But, to solve each pleasing Rebus,
 Let us leave the shady groves,
 And th' enlivening rays of Phœbus,
 To the gentle cooing doves.

Woolwich, Bayley, Babel, Maken,
 Every Rebus make appear ;
Earthquake, Something, Kid-gloves, Carmine :
 Farewell, Ladies, 'till next year.

14. *The same answered : By Miss Wall.*

On May-day, last year, I chanc'd to appear,
 Among the gay throng on the green ;
 The charming and fair Miss *Maken* was there,
 And hail'd by the swains as their queen.
 Her cheeks they outvied the rose in its pride,
 Made *Carmine* like umber appear ;
 With joy in her eyes, she handed the prize,
 And her *gloves* for friend Bayley to wear.
 Each charming young maid, with neatness array'd,
 Was led by her swain to the ring ;
 To music they danc'd, which greatly enhanc'd,
 And enliven'd the beauties of spring.

No. 13. Diary Rebuses answered. 17

The linnet and jay, chirp'd sweet from the spray,
 And the rural song briskly went round;
 The cuckoo and thrush, join'd too from the bush,
 And made the *Earth quake* with the sound.
 The meadow and trees, that wav'd with the breeze,
 Amused and pleased the mind;
 Like *Babel* on high, the pine you might spy,
 In courtesy bow with the wind.
 Lifetime hasted on, tho' scarce thought upon,
 And *Something* improved the bliss;
 You fair ones now say, of Woolwich, I pray,
 What pastime is equal to this.

15. *The same: by Mr. Jona. Walton, at Trusterly School.*

In *Dia's* page, see *Bayley* shine,
 And *Maken* sweetly sing,
 On *Babel*, *Earthquake*, and *Carmine*,
Kid-gloves or any thing.
 They make our time glide smoothly by,
 And cheer the drooping mind;
 Then sound the praise of Woolwich high,
 Where learning is refin'd.

SUPP. REBUSES AND CHARADES ANSWERED.

1. *The Invitation: by Mr. Peter Steel Dale, Liverpool.*

Come, *Sanderson*, let us away to the fair,
 And join in the *Revels* and merriment there;
 Haste to salute the fair queen of the *May*,
 Who, deck'd in her *Ear-rings*, is chosen to day.
 Each swain with his *Madam* will frolic around,
 And *Friendship* and mirth and gay joy will abound,
 But *Hatred* or malice will no where be found.
 Fond lovers their *Sonnets* so sweet will rehearse,
 Where love's tender passion is seen in each verse.

2. *Sonnet: by Mr. John Hildes, Liverpool.*

Tho' *Sanderson's* sweet numbers flow
 More smoothly than the clearest rill;
 The sweetest of the tuneful tribe,
 I reckon thee, *Eliza Still*.
 To *Revel*, some at eve incline,
 And take delight in doing ill;
 But I would rather *Sonnets* read,
 Compos'd by thee, *Eliza Still*.

18 Diary Supplement, 1800.

And, dearest *Madam*, be assur'd,
If I could but obtain my will;
With pleasure I, before *May-day*,
Would wed with thee, *Eliza Still*.

New *Ear-rings* I for thee would buy,
Like turtles we would coo and bill;
Then none would be more blest than I,
Possess'd of thee, *Eliza Still*.

But oh, I fear some other man,
Is destin'd thy dear arms to fill;
And in fond love and *Friendship* true,
To live with thee, *Eliza Still*.

But if thy *Hatred* I incur,
By using thus a harmless quill;
I'll strive to banish from my mind,
All thoughts of thee, *Eliza Still*.

3. *The same: by Mr. Tho. Hindmarsh, Rusheyford.*
Can the *Revelings* on *May-day* such pleasures impart,
As the *Friendship* of *Sanderson*, *Woolston*, or *Smart*;
To *Ear-rings* and *Sonnets* no *Hatred* I bear;
But *Madam* oft makes them a bait to ensnare.

4. *The same: by Mr. Tho. Rimmer, Standish School.*
Diarians! how busy to please *Madam Di*.
May-day is approaching—how busy am I!
How puzzl'd, perplex'd, solutions to find!
So mystic enigmas!—so changing my mind!
A subject to write on perplexes me next,
More so then a parson to handle his text:
On *Hatred* or *Friendship*, says one in my *Ear*,
(*Miss Sanderson* surely) you must write for next year:
No miss, retorts I, nearly crazed, forsooth,
A *Sonnet* I think will *Reveal* ev'ry truth.

5. *The same: by Mr. Alex. Rowe, Regiunis.*
Sanderson, *Madam*, *May-day*, and *Revel*,
The rebuses clearly explain:
Then *Sonnet*, *Hatred*, *Friendship*, and *Ear-ring*,
Like answers to charades contain.

6. *Invitation to brother Diarians: by Mr. Rob. Sanderson.*
In a snug little village, with rabbits surrounded,
Where rosyfac'd plenty, by nothing is bounded;
Where politics, fox hounds, and some little scandal,
With tempora et aeterna, all piously handle,
R. Sanderson lives; still engag'd in a squabble,
To chase off care, sorrow, and such like rude rabble;

No. 13. Supp. Rebu. & Charades anf. 19

By laughing at Folly.—Should it laugh at him,
 Why—still he would laugh, for he's pregnant with whim.
 But a truce with description, it was my intention,
 Something else, of a quite different nature, to mention.—
 Should a brother Diarian e'er chance to come past, on
 A horse, in a chaise, or what not, I entreat him,
 To give me a call; I will heartily greet him.
Madam Di shall assist me to make it a gay day,
 With *Sonnets* and *Ear-rings*, I'd coin a new *May-day*;
 While *Friendship*'s ownself should lend his assistance,
 To keep *Hatred*'s tribe at a suitable distance.—
 I've a small bill of fare (if it fail, I'm mistaken)
 Consisting of tea, *Lucian*, *Latin* and *Bacon*;
 Good *Hyson* for breakfast, a ham for our dinner;
 On *Horace* we'd sup, (fit for saint or for sinner)
 With *Leth'an liquor*, to make it good cheer,
 (Now *Lethe* means only, a lake of strong beer)
 The evening we'd pass in singing and laughter,
 For laugh we must first—then be serious after.
 All poets love good things—if fortune wou'd send 'em,
 And one has sung sweetly, *est dulce bibendum*;
 When authoriz'd thus, we would merrily *Revel*,
 And fling the old scoundrel, *Care*, to the devil.

7. The same: by Mr. John Savage, of Greens Norton.

Sanderson, with humorous lays,
 Heightens *Madam Dia*'s praise;
 Blithsome as a *May-day* queen,
 Ever kind and free he's seen.
Sonnets oft, to *Smart* his friend,
 Free from *Hatred*, he has penn'd;
Friendship in each line appears,
 True as *Ear-rings* to the ears.

8. To Mr. Sanderson:—Occasioned by his Address to Dame Fortune. By Mr. T. R. Smart.

Dear *Sanderson*, in *Friendship*'s strain,
 The sportive muse resumes again,
 Blythe as the lark on *May-day*;
 At *Madam Fortune*'s name alert,
 The maid like other misses, pert,
 Chats like a modern lady.

I own I felt a vast surprize,
 Like you, could scarce believe my eyes,
 My faith!—enough to waver it;

That faith, which most devoutly swore,
She ne'er had known the like before,
That merit was a favourite!

But since your *Sonnet* gain'd the prize,
I'll boldly whisper, faith she lies,
Led by a vague opinion;
While stubborn fact will publish plain,
True wit can rise in Hutton's reign,
And merit gain dominion.

Tho' disappointed *Hatred* roars,
And Envy opes her hundred stores,
Their malice to discover;
To praise the bridge o'er which we pass,
Whoe'er forbears, is but an ass,
If safely he get over.

To Fortune tune once more the string,
In every *Ear* her wisdom *ring*,
Her prudence, taste, and spirit;
And may you long, without alloy,
Revel in each luxuriant joy,
And all her smiles inherit.

9. *The same: by Mr. John Smith, Alton Park.*

Sanderson a learned blade is;
Madam, we say to the ladies;
May-day is a time of pleasure;
Reveling toppers waste their treasure;
Charlotte's Sonnets are admired;
Hatred seldom is desired;
Friendship is a noble passion;
Ear-rings long have been in fashion.

10. *On Mr. Smart: by Miss Eliza Still.*

In *Sanderson's* praise, I with pleasure wou'd join;
But what can I say, after one so refin'd
As our bard, Mr. Smart, whose beautiful verse
Might the anger of *Madam Roxana* disperse.
As for *Holidays*, *Revels*, or what else you please,
He can veil or unveil them, with pleasure and ease;
And beautiful *Sonnets* he's written a many;
But *Hatred* I think he'll ne'er harbour for any:
Sweet *Friendship* is often the theme of his song;
Genius, sense, and sublimity to him belong.
My very best *Ear-rings* I'd give for his muse;
My ambition I hope, my dear friends, you'll excuse.

No. 13. Supp. Rebu. & Charades anf. 21

11. *The same answered: by Virtet.*
 On *May-day* morn what *Revel* rout,
 In London streets are found,
 If *Sanderson* and *Madam Stout*,
 Will please to travel round;
 'They'll *Sonnets* hear in *Friendship's* praise,
 Sung by the happy train,
 'Gainst *Hatred* they their voices raise,
 Nor sing their songs in vain:
 In praise of Nelson's glorious deeds,
 And Britain's happy king;
 Of Vincent's, Duncan's, and Howe's medes,
 Till all their *Ears* do ring.
12. *The same: by Mr. Jona. Walton, at Frosterly School.*
 To hail the sweet and blooming *May*,
 Did *Sanderson* appear;
 With *Madam Di*, in *Pendants* gay,
 And grac'd the wake last year.
 Sweet harmony thrill'd thro' the air,
 The *Sonnet* went around;
 All *Hate* and *Revels* banish'd were,
 And purest *Friendship* crown'd.
13. *The same: by Mr. John Warkman, of Weardale.*
 The first is *Sanderson* I find;
 The third is *May-day*, ever kind;
 The second is *Madam P.* the fair;
 The fourth is *Revel* I declare.
 A *Sonnet* names the first charade;
 The third by *Friendship* is display'd;
 The second *Hatred* black is found;
 And *Ear-ring* doth the fourth expound.

Various other ingenious answers to the Supplement Rebuses and Charades, were given by the following ladies and gentlemen, viz. B. Bevan, Rob. Bradley, J. Brown, John Cairns, Tho. Coulson, Tho. Coultherd, T. S. Evans, Rev. J. Exbank, Tho. Glawville, B—d H—n, John Harrison, Sam. Harvey, Jos. Hatfield, Noah Heath, Jos. Hindson, Wilos Hostman, J. Jackson, John Jefferson, Lavinius, Da. Lewis, Wm. Marriott, Abr. Moore, John Needham, John Scholfield, Miss Single, J. Sparrow, J. J. Thompson, Tho. Thorpe, Jun. John Tindale, James Thoubren, Wm. Watkins, Eliz. Wright, &c.

QUERIES ANSWERED.

1. *DIARY QUERY* answered, by Mr. John Savage.
 I think a late marriage is probably the most conducive to human happiness. For, in a hasty or early marriage, when

the parties have but little or short knowledge of each other, it is a great chance that their tempers may not accord well together. Sometimes to be sure they may; but, I have too often, and more frequently seen it the reverse, and more so than what happens to those who have kept company for a considerable time before they married.

Miss Eliza. Wright, says,—In my humble opinion, neither early nor late marriages are the most conducive to human happiness. For, when a couple has married young, it sometimes happens, when sober reason has resumed her seat, the parties wonder how they came together. On the other hand, that late marriages are not very conducive to happiness, is known even to a proverb. In short, for my own part, I should prefer an arithmetical mean between the two.

3. DIARY QUERY answered, by Mr. Jos. Hindson.

When rain begins to collect high in the atmosphere, and fall through the air; in descending, it unites with other aqueous particles. Consequently, the farther it falls, the more particles it unites with. Hence then, the reason is obvious.

Mr. Jonathan Walton, says,—The small descending particles of water, by impinging on others of a like nature, gain a considerable increase of magnitude and quantity in their descent; consequently, the lower the gage is fixed, the greater will be the quantity of rain caught.

4. DIARY QUERY answered, by Mr. Ra. Dutton.

The wind blew high, the wind blew low,
And weak and strong anon:
The sound therein exactly so,
In waves came flowing on.

The same: by Mr. John Savage.

Varying as the changeful wind,
Is the sound of lofty bells,
As its force or turn we find,
To the ear it sinks or swells.

Mr. Jonathan Turner, says,—On considering that the motion of air is undulating as that of water; and that it is the vehicle by which sound is conveyed to the ear; it is readily inferred, that the different actions of such undulations on the ear, are the causes of the different sensations.

1. SUPPL. QUERY answered, by the Rev. Tho. Scurr.

In the year 1798, the Golden Number is found to be 13, which gives the time of mean new moon the 17th of March;

No. 13. Supp. Queries answered. 23

and consequently, the time of the next mean full moon on April 2nd, which happens on Monday; therefore Easter-day is on the 8th of April.—OBSERV. Find what day of the week the full moon is on, then the next Sunday is Easter-day.

The same answered, by Mr. James North.

Two reasons may be assigned, for the propriety of fixing Easter Sunday in the year 1798, on the 8th, instead of the 1st of April, either of which is sufficient.—The first is, that Jerusalem (for the longitude of which place it is that the Pascal full moons are calculated) is more than two hours eastward or before the time at London; and that consequently, when it is eleven o'clock on Saturday night here, it will be one on the Sunday morning there.—The second is, that the *Astronomical* day, which is always used in computing the motions of the heavenly bodies, begins and ends at noon; consequently Saturday, the 31st of March, does not end till Sunday noon, the 1st of April; of course, the first Sunday after the Astronomical day of the full moon, will be that which in the Almanack is fixed for Easter-day.

2. SUPPL. QUERY answered, by Mr. B. Bevan, Surveyor.

The expression plainly originated from the Bell Sheep, in a flock, being the leader.

The Rev. Mr. Furnass, says,—It is well known that, before the public roads were kept in the excellent manner they now are, it was usual to carry merchandise, overland, on pack horses; the first of which, known for steadiness and good conduct, had commonly a bell, or string of bells, hung to his neck: this served both as a signal to his followers, and to announce the arrival of the carrier. And hence seems to have arisen the phrase in question.

Mr. Jonathan Walton, says,—When a person outstrips his companions, or competitors, in any practice, or achievement, he is said to bear the bell; alluding, I suppose, to the horse, which carries the bells, always going foremost.

3. SUPPL. QUERY answered, by Mr. Alex. Rowe.

The assertion seems not to be true; for it is well known, to astronomers, that the summer half year, in the northern hemisphere, is longer than the winter half, by the space of eight days nearly.

The same answered, by Mr. Jona. Walton.

As the sun, in his annual course, continues nearly eight days longer in the northern hemisphere, than in the southern;

therefore the assertion cannot be true. I suppose this error is founded on the popular opinion, that the duration of the sun on each side of the equinoctial, is equal.

4. SUPPL. QUERY answered, by Mr. B. Bevan.

Simple Iron will not harden, by being heated, and suddenly cooled again; but when saturated with carbon, that is, when made steel, it will. Which I suppose is owing to the heat violently escaping, assisted by the carbon; thereby compressing the component particles.

Mr. Tho. Crosby, says,—Red hot iron suddenly cooled in water acquires a more abundant quantity of phlogiston, salts and sulphur, than when left to cool in the open air: these being the ingredients which harden iron, and, in due proportion, reduce it into steel. It is, therefore, highly probable, that when iron is left to cool of itself, the inflammable principle, which is the cause of hardness, escapes into surrounding bodies, and so leaves it soft or malleable.

Thus various ingenious answers to the Queries, both in the Diary and Supplement, were given by the following ladies and gentlemen, viz. B. Bevan, J. Brown, John Cairns, W. Clark, Thos. Coulson, Tho. Crosby, P. Dutton, Rev. J. Eschank, Wm. Francis, Rev. J. Furness, Edm. Hall, Jos. Hatfield, Jos. Hindson, Tho. Hornby, Tho. Myres, John Needham, B. Neoforensis, Alex. Rowe, John Savage, Rev. Tho. Scurr, Rd. Smithson, John Sowerby, Tho. Squire, Miss A. T. J. J. Thompson, Tho. Thorp, jun. Jona. Turner, Virtet, Jona. Walton, Eliza. Wright, &c.

NEW ENIGMAS.

I. ENIGMA, by Mr. J. Brown, of Surfleet.

Ingenious fair, who grace Britannia's isle,
We beg to entertain you for a while.
Lo! yonder bright angellic host behold,
Enraptur'd, how they strike their harps of gold;
Hark! how they make heaven's lofty concave ring,
With hallelujah's to th' almighty king;
We then are there, and claim in heaven our birth,
Altho' most frequent seen and heard on earth.
We aid all ranks of mortals, 'tis well known,
From beggar, to the prince upon the throne;
The priest and tutor help t' instruct mankind,
Are us'd to sooth and captivate the mind;
Sometimes are rough and clamorous, sometimes kind,
Sometimes are vain and empty as the wind;

Sometimes are courteous, and vastly civil,
 Anon, are aggravating as the devil.
 With ladies too, we frequently abound,
 At tea-table, when merry chat goes round.
 But ah! we also aid mankind to lie,
 To deal in scandal, fraud, and treachery;
 We aid the blasphemer to swear and curse,
 The robber also to demand your purse.
 But for us, the king would ne'er ascend the throne,
 Nor Billy Pit e'er make his budgets known;
 Commons and lords would crowd the house in vain,
 For without us they nothing could explain;
 The judge could not pass sentence, counsel plead,
 Doctor prescribe, or lawyer pen a deed,
 The lover flatter, or the school-boy read;
 The poet sing his sweet enraptur'd theme,
 Nor politician broach his deep-laid scheme.—
 Take one hint more, and then ye fair adieu,
 Numbers of us are copious form'd by you.

II. ENIGMA, *by Mr. Peter Steel Dale, Liverpool.*

Attend, dear ladies, to this mystic page,
 That forms my entry on Diarian stage;
 Where if your goodness deign my faults to bear,
 I wish to visit you each circling year.
 For tho' no florid genius crowns my lays,
 I have an humble, fervent wish to please,
 That still emboldens me, where merits fail,
 To trust your goodness, and pursue my tale.

Could I my various uses all unfold,
 I'm sure 'twould tire you, 'ere the tale be told;
 To ev'ry beau and belle I stand a friend,
 Tho' oft to drunkards I my aid do lend;
 Th' astronomer will own my matchless pow'r,
 When he the heav'nly bodies does explore;
 The aged too do me full often use,
 To help their sight, and help I ne'er refuse.
 In ev'ry habitable house you'll see,
 Each room delightful made, by help of me.
 In spacious gardens I am often found,
 But mostly where exotic plants abound.
 Another hint before I bid farewell,
 'Tiro' me you oft the time of day may tell.

III. ENIGMA, *by Miss T. Davis.*

In days of old, my birth I date
 'Fore Adam and his loving mate;
 Tho' I'm a carnal thing you'll find,
 And near allied unto the blind,
 If you observe without disguise,
 You'll find me now before your eyes.
 I'm old, I'm young, to all a friend,
 I'm large, I'm small, you may depend;
 I'm red, I'm black, and pale 'tis true,
 By most belov'd, dislik'd by few;
 I'm English, French, I'm Roman too,
 Of ev'ry nation, soon you'll view.
 I like an infant oft am fed
 With portions small, then put to bed.—
 If you, dear ladies, walk abroad,
 I go before you in the road,
 And like a faithful friend may say,
 Ne'er out of sight from you I stray.
 And as I do your course direct,
 I hope you'll pay me due respect.
 When to the fields you do repair,
 To hunt the fox, or else the hare,
 I soon make known to you the scent,
 Point out the way old Reynard went;
 Smack goes the whip, begins the dance,
 Led on by me the hounds advance.—
 My fame it sure should now resound,
 For I have been the world around,
 And like a faithful pilot hurl'd,
 Led Cook and Anson round the world.
 My name I'm sure, is now so clear,
 I'll bid adieu untill next year.

IV. ENIGMA, *by Mr. R. Dutton, Kingsby, near Frodsham.*

Ladies attend, respect with me I bring,
 My pasport's sign'd by either queen or king.
 From a far country first my parent came,
 And from that country I deriv'd my name;
 Since then, from diff'rent nations she has come,
 And yet (proud word) England's my native home;

Brothers and sisters I have not a few ;
Some young, some old, and some between the two ;
A little, hardy, restless, wand'ring race,
Seldom remaining long in any place.
My form and features next to you I'll tell :
(Ladies don't smile, I know you love me well)
I've only half a face (but patience yet)
Such as it is, it favours the brunette :
I've also half a head ; of legs I've none ;
I've half a nose ; of eyes I have but one ;
And even that has never shed a tear,
But yet I've charms to win the lovely fair ;
More than the Delphian oracle, by far,
I've been consulted pending peace and war ;
And furthermore, I can incline the scale,
And shew the way to peace, when princes fail.
In pleasure's limpid stream I'm often found,
And with the rich and great I most abound ;
Not always on the happy side you'll see,
For many I have sent to tyburn tree,
And almost every traitor, every thief,
Condemns our brotherhood, for all his grief.
May those who use me well, and those alone,
Find out my name, and take me for their own.

V. ENIGMA, by Mr. Joseph Gilbert, of Burgh.

From limpid streams, or ocean's wide expanse,
First into being wond'rous I advance ;
To lofty stations quickly see me rise,
Look down on kings, and frown upon the wise.
In various hues, in ev'ry shape I'm seen,
With sweet Lucinda walk along the green.
In beauteous splendour richly now array'd,
Adorn'd with every tint, and every shade ;
Now like a chrysolite, now opal shine,
The ruby's lustre, and the sapphire's mine ;
Now ting'd like amethyst my robing flows,
And now more full, as carbuncle it shows.
My form so strange, so diff'rent, unconfin'd,
Nor can I boast a nice, discerning mind :
Yet once transform'd, as heathen story tells,
While with mad pride, the giant haughty swells,
A beauteous fair, like Juno, I became,
The hope of honor, while the cause of shame ;

When by my lover press'd to fond embrace,
From me descend, or monstrous, ugly race,
A race deform'd, as fallen virtue foul,
Hideous as vice, that sinks the human soul.

VI. ENIGMA, *by Mr. Noah Heath, Sneyd-green.*

Behold, in purest robes I now descend,
Your greatest virtue, and sincerest friend;
A faithful guardian to mankind shall be,
Till time shall roll into eternity.
I call the sinner from the verge of hell,
And gently lead to powers celestial.
When hostile nations rouse to wars alarms,
And angry furies cry, to arms, to arms!
When fertile fields with human bones strew'd o'er,
And thousands weli'ring in their ouzing gore;
From those tremendous scenes with speed I fly,
To assert the triumph of the victory.

I'm not to righteous deeds alone ally'd,
For to the vilest crimes I am employ'd;
I strike the pris'ner's guilty heart with fears,
When he before the awful judge appears;
Thousands have gain'd their liberty by me,
And thousands swung upon the gallows tree.—
I can the darkest mystery explain,
That all the sacred writings do contain.

O still, ye fair, while you on earth abide,
For ever keep me as a sacred guide;
That when the hailing cherubs trump shall sound,
To summon all the universe around;
Then shall your just reward by me be given,
And gain a bless'd inheritance in heaven.

VII. ENIGMA, *by Mr. Tho. Hindmarsh, Rusheyford.*

Whether I being had, I'll not dispute,
Before Eve eat of the forbidden fruit;
Or when the pair, for that offence, were driven
From Eden's bowers, I sprung the curse of heaven;
This I shall wave.—But since I've had my birth,
In various parts of this all-teaming earth,
On open heaths my wanton growth extend,
In fertile fields with waving Ceres bend.
Sometimes against me march a female band,
In dread array, a vast extent command;

Ye
Pr
Bu
An
Bu
Si
An
M
In
An
W
N
Y
E

ever
Supp

CH
Y
An
T
To
Su
T

An
K
Fo
If
It
SH
U
E
An
C
I

If
SH
I
E
C
Bu
Fo

Yet without armour few to meet me dare,
 I'm so equipt with instruments of war;
 But torn at length both root and branch away,
 And left to mingle with my kindred clay.
 But stop, my muse, no longer thus complain,
 Sing me advanc'd in a more lively strain:
 An artist bold, fresh vigour thro' me brings,
 My vengeance points, and aggravates my stings,
 In awful arms I now am taught to shine,
 And all the splendour of a court is mine;
 Where I exulting, neighb'ring nations tell,
 None shall provoke me, and in safety dwell.
 Ye tuneful bards, who grace the present age,
 Enrol my name in Di's renowned page.

VIII. Or PRIZE ENIGMA: *By G. H. J. of Stanion.* [Who-
 ever answers it before Feb. 2, has a chance, by lot, for 10
 Supplements.]

Clio assist, and Thalia deign to lend
 Your aid and service to a youthful friend;
 And list, ye fair, whose ever searching wit,
 The most disguis'd and dark enigmas hit,
 To one who hopes to tell his tale, tho' plain,
 Sufficient just a place in Di to gain,
 Then he his utmost wishes will obtain. }

When winter's chilling frosts no more are seen,
 And spring once more returns to cheer the green,
 Known only to attend on females fair,
 For oft with them I go to take the air.
 If in their walk bright Sol should dare offend,
 I then protect their beauty, them defend:
 Should Colin, now the pride of yonder plain,
 Urge his warm passion, a lov'd maid to gain,
 Behind my back the blush is hid from sight,
 And Chloe seems the youthful swain to slight;
 Or should she to the playhouse chance to go,
 I screen her from rude glances of the beau.

But only to defend you'll say I'm seen:
 If that's the case, I here must change the scene:
 Should a full house with too much heat abound,
 I am the only refuge can be found.
 Sometimes a love-tale sweet I do relate,
 Or have describ'd the wounded Strephon's fate.
 But stop, my pen, no longer I need write,
 For you, no doubt, my name have brought to light.

30 **Diary Supplement, 1800.**

NEW REBUSES, CHARADES, AND QUERIES.

I. REBUS: By Mr. Wm. Marras, Boston.

To the half of a country, famous of old,
 Tho' now it in ruins doth lie;
 Add half of the heaviest metal that's sold,
 Or the dearest you ever did buy;
 To these; add two thirds of a grain that's not nice,
 Or a town that in Sussex is found;
 Then the name of a gent. may be found in a trice,
 Whose works do his merit resound.

II. REBUS: By Mr. Tho. Thorpe, jun. Swineshead,

Find a term oft applied to a youth that is smart,
 To which, of the vicar's just demand add a part;
 Then you'll see what a coward with courage can fire,
 What ladies all prize, and what most gents. admire.

III. REBUS: By Mr. John Warkman, Weardale.

The name of a king in history renown'd,
 For having a son whom victory crown'd,
 Join'd to what's a married dame's delight,
 When loving, humble, and contrite,
 Will name a virgin, modest, fair, and kind,
 Whose face is beauteous, noble is her mind.
 May she to me for life be given,
 I then would find on earth a heaven.

IV. REBUS: By Mr. Wm. Watkins, of Wylam Engine.

The son of Nestor, who to France gave name;
 Laertes' son, a king of might and fame;
 A king of Thrace, by Dolon put to death;
 Tantalus' wife, who weeping lost her breath;
 A king of Thrace, by warlike Paris slain;
 Two rural gods, I lastly here proclaim:
 A virtuous dame th' initials then will shew,
 Excell'd by none, and equall'd but by few;
 Whose verses soft inspire the present age,
 And is the queen of Dia's blooming page.

I. CHARADE: By Mr. H. W. Mapré.

The parish one Sunday at church was collected,
 A stone from the steeple fell down unexpected;
 My first was the cause.—Well! it made a fine pother!
 Some tumbled up this way, and some down the other.

No. 13. New Rebuses, Charades, &c. 31

It frighten'd the parson quite out of his wits,
My second (poor girl) scream'd away into fits!
When these things were righted, and happily ended,
The mason set to, and the steeple was mended;
Yet not till my whole its assistance bestow'd,
And pleas'd all the workmen, by light'ning their load.

II. CHARADE: *By Mr. Rob. Sanderson.*

My first's a sacred place, tho' oft profan'd,
By the loud snoring of some drowsy sinners;
My curious next is—pensions not obtain'd,
Blotch'd faces, rainy days, rent gowns, spoil'd dinners.
The tuneful bard, who constitutes my whole,
(A name that must be Britain's pride and boast)
Alive, with Satire's scourge cou'd vice controul,
And still, tho' dead, can charm us with his ghost.

III CHARADE: *By Mr. Tho. R. Smart.*

While round my second, beauty's pride
Are seated happy, side by side,
In social chat they quench their thirst,
With pure libations from my first;
But when the simple treat is o'er,
My third's recesses they explore,
My first upon my second plac'd,
With both conjoin'd my whole is grac'd.

IV. CHARADE: *By Mr. Gilbert Young, Spalding.*

My first is crown'd a god on Egypt's plains;
To break the stubborn clod in England deigns:
My next's a shallow part of some great stream,
And from my whole the rays of science beam;
A city fam'd, as British poets sing,
Where you may live in Aganippe's spring.

I. QUERY: *By Jacobus, of Norwich.*

Why did our ancestors employ buffoons or Jesters at their tables during meals?

II. QUERY: *By Mr. Tho. Molineux, Macclesfield.*

How many hours and minutes was the sun above the horizon, in the latitude of $51^{\circ} 31'$ north, during the year 1798, being the second year after Bissextile? It is required also to find the average length of one day for the said latitude?

III. QUERY: *By Mr. Jonathan Turner.*

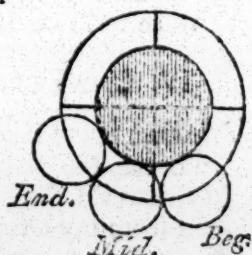
It is an old adage that, "There is reason in roasting of eggs."—Pray from what has it originated?

IV. QUERY, *by Miss Eliza Wright.*

I shall take it as a great favour, if the contributors to my friend Lady Di, will inform us, why smatterers in learning are commonly more polite than philosophers?

ECLIPSES in the Year 1800.

There will be four eclipses this year, viz. two of the sun and two of the moon; but only one of the latter will be visible in these parts. They happen in the following order:—The first is a partial eclipse of the moon, which happens on Wednesday the 9th of April, but invisible here, the eclipse being over before the moon rises. It begins at 3h. 6m. and ends at 5h. 41m. afternoon; the digits eclipsed being $6^{\circ} 50'$ on the moon's south limb.—II. The second is a central and annular eclipse of the sun, on Thursday the 24th of April, in the morning, but invisible here, as the eclipse is over before the sun rise to us. The ecliptic conjunction happens at 28m. before one o'clock in the morning.—III. The third is a partial and visible eclipse of the moon, on Thursday, Oct. 2. The times and appearance will be as follows for the latitude of London, and nearly the same in all England, viz. beginning 9h. 0m. 45s. ecliptic opposition 9h. 46m. 12s; the middle at 9h. 56m. and the end at 10h. 51m. 15s. afternoon. Digits eclipsed are $2^{\circ} 43'$ on the moon's northern or upper side.—IV. The fourth, or last, is a solar eclipse, on Saturday the 18th of October, at 1h. 12m. in the morning; but, on account of the moon's south latitude, this eclipse will be invisible to us (although it falls in the day time), and indeed to all Europe. But in the great Southern Ocean, this will be a great eclipse, being indeed to some parts central and total, where the moon comes in a line between the sun and the eye of the spectators.



M. B. The letters for the Supplement, post-paid, must be sent so as to come to hand, at latest, before the end of April; but the sooner before that limit, the better. They must be addressed thus:—To the Author of the Ladies' Diary, at Stationers' Hall, London.

No. 13. Supp. Questions answered. 33

ANSWERS TO THE SUPPLEMENT QUESTIONS.

I. SUPPL. QUEST. (77), *answered by Mr. Jos. Brewer, Preston.*

In 867·3472 yards there are 31224·4992 inches: and since the hand moves round the dial plate 24 times every day, it makes 8760 revolutions in the year or 365 days; therefore $31224·4992 \div 8760$ gives 3·56444 inches for the circumference of the circle described by the extreme point of the hand: consequently $3·56444 \div 6·2832$ (or 2 times 3·1416), gives ·56729692 inches, for the radius, or length of the hand required.

The same answered, by Tho. Coulthard, of Sixdayswork.

First, $31224·4992 \text{ inches} \div 365 \times 24$ gives 3·56444 the circumference of the circle described by a revolution of the minute hand. Then $3·56444 \div 3·1416 \times 2$ gives ·5673 inch, the length required.

The same, by Mr. Joseph Moore, Heath, near Halifax.

First, $867·3472 \times 36 = 31224·4992$ inches. Again, $365 \times 24 = 8760$ the number of revolutions which the minute hand makes in a year. Then, $31224·4992 \div 8760 = 3·564440547944$ the circumference of a circle which the extreme point of the minute hand makes. Hence there is given the circumference to find the radius = ·567456 inches, the length of the hand required.

The same, by John Warkman, of Weardale.

If the given space, moved over by the extreme point of the minute hand in a year, be divided by 365, it will give 85·5465 inches, which is the space gone over in a day: divide this by 24, and we have 3·5644 inches for the circumference of the circle described by the minute hand: hence its length is found = ·5672 inches.

Much in the same manner the solution was given by Messrs. Arator, S. Baker, B. Bevan, John Blackwell, Geo. Boulby, Wm. Burdon, Henry Clay, John Craggs, Thomas Crosby, Wm. Davis, T. S. Evans, Rev. J. Ewbank, J. Forest, Wm. Francis, Rev. J. Furnass, E. G. John Harrison, J. Hartley, John Hawkes, John Haycock, T. Hewitt, Gilb. Henderson, Charles Johnson, W. H. Jones, John Latey, J. Lockwood, W. M. John Marriott, Ja. Mason, Wm. Middleton, John Mitchell, Abr. Moore, A. N. W. Newby, Tho. Nield, Wm. Quaife, John Ramsay, Wm. Robinson, Aug. Roullier, Js. Roxbottom, Alex. Rorer, John Ryley, John Scholfield, Rev. Tho. Scurr, J. Simcock, John Smith, Tho. Squire, John Surtees, J. J. Thompson, Jas. Thoubren, Virtet, Jona. Walton, Wm. Watkins, Tho. J. Wood, Josiah Wooldridge, Eliza. Wright, &c.

34 Diary Supplement, 1800.

II. SUPPL. QUEST. (78), answered by Mr. Wm. Davies, Schoolmaster, of Croxan.

Put x = the length of the longest ladder, y = the height of each story. Then $x^2 - 9y^2 = 15^2 = 225$, and $(x-10)^2 - 4y^2 = x^2 - 20x + 100 - 4y^2 = 225$, or $x^2 - 20x - 4y^2 = 125$. By substitution, &c. $x^2 - 36x = 45$. Hence $x = \sqrt{369} + 18 = 37.209$ feet, the longest ladder. Consequently 27.209 is the shorter; and $3y = \sqrt{x^2 - 225} = 34.0515$ the height of the house.

The same, by Mr. John Harrison, Wearshead School.

Let $3x$ denote the height of the house, and $2x$ that of the second story. Then $\sqrt{4x^2 + 225} + 10 = \sqrt{9x^2 + 225}$. Hence $x = \sqrt{54} + \sqrt{5904} = 11.3506$. Consequently 34.0519 feet is the height of the house; and 37.209 and 27.209 the length of the two ladders.

The same, by Mr. John Haycock, Teacher of Mathematics, &c. and Land, &c. Surveyor, Free-school, Stanstead.

Put x = length of the shorter ladder; then, by the question, $x^2 - 15^2 : (x+10)^2 - 15^2 :: 4 : 9$; hence $x^2 - 15^2 : 20x + 100 :: 4 : 5$; then $x^2 - 16x = 305$, and $x = 8 + 3\sqrt{41} = 27.29$ the shorter ladder. Hence $x + 10 = 37.209$ the longer ladder; and $6\sqrt{13} + 3\sqrt{41} = 34.052$ nearly, the height of the house.

The same, by Mr. James Thoubren, Lanchester School.

Put $a = 15$, and x = the longer ladder. Then $x - 10 =$ the shorter, $\sqrt{x^2 - a^2}$ the height of three stories, or the whole house, and $\frac{2}{3}\sqrt{x^2 - a^2}$ the height of two stories. Hence $a^2 = (x-10)^2 - \frac{4}{9}(x^2 - a^2)$; then $5x^2 - 180x = 5a^2 - 900$, or $x^2 - 36x = a^2 - 180 = 45$. Hence $x = 18 + \sqrt{369} = 37.209375$ the longest ladder. Then $x - 10 = 27.209375$ the shorter, and 34.052 the height of the house.

N. B. This question is nearly the same as quest. 852 in the Ladies Diary, which was neatly constructed by Amicus.

Neat solutions were also given by Messrs. Bevan, Blackwell, Boulby, Brewer, Burdon, Clay, Coulthard, Craggs, Evans, Exbank, Forest, Farrah, Francis, Furnass, E. G. Hartley, Hewitt, Hawkins, Henderson, Henry, Hunter, Jones, Johnson, Latay, Laurent, Lockwood, W. M. Mason, Middleton, Mitchell, Moore, Myres, A. N. Newby, Nield, Quaise, Ramsay, Robinson, Roullet, Rowbottom, Rowe, Ryley, Scholfield, Scurr, Smith, Squire, Surtees, Virtet, Walton, Warkman, Watkins, Wood, Wooldridge, Wright, &c.

III. SUPPL. QUEST. (79), answered by Mr. T. S. Evans.

Let $x-y$, and x , and $x+y$ represent the three dimensions, whose product is $x^3 - xy^2 =$ the content of the cistern. Put $a = 288$

No. 13. Supp. Questions answered. 35

$\times 282 = 81216$;

then by the quest. $x^3 + 3x^2y + 2xy^2 = x^3 - xy^2 + 2a$;

and $x^3 - 3x^2y + 2ay^2 = x^3 - xy^2 - a$;

these transposed give $3x^2y + 3xy^2 = 2a$,

and $3x^2y - 3xy^2 = a$;

from these we get $6xy^2 = a$, and $2x^2y = a$; therefore $x = 3y$, consequently $y = \sqrt[3]{\frac{1}{18}a} = 16.524297$ inches. Hence the three dimensions are 33.048594, and 49.572891, and 66.097188 inches, and the true content 384 gallons.

The same answered, by Mr. Cha. Johnson.

It easily appears, from what is given in the question, that the dimensions are in the proportion of 4, 3, and 2. Hence

the $\sqrt[3]{\frac{576 \times 282}{5.4.3. - 4.3.2}}$, or $\sqrt[3]{\frac{288 \times 282}{4.3.2. - 3.2.1}} = \sqrt[3]{4512}$

$= 16.5242984513$ inches $=$ the common difference: which multiplied by 4, 3, 2, separately, gives 66.0971938052, and 49.5728953539, and 33.0485969026, for the length, breadth, and depth of the cistern; from whence the content is found $= 108288$ cubic inches, or 384 ale gallons.

The same, by Mr. John Ramsey, London.

Let $2x$, $3x$, and $4x$ be the dimensions of the cistern; then its content is $24x^3$; and by the question $60x^3 = 24x^3 + 576 \times 282$, or $x^3 = 16 \times 282$, and $x = \sqrt[3]{16 \times 282} = 16.524$ inches. So that 33.048 is the depth, 49.572 the breadth, and 66.096 the length; also the content 108282.13262 cubic inches or 384 ale gallons.

The same, by Mr. John Surtees, Wearmouth.

Let $x - z$, x , and $x + z$ be the three dimensions, and $n = 282$ inches. Then the solidity $= x^2 - z^2 \times x$; and by the question $x^3 + 3x^2z + 2xz^2 = x^3 - xz^2 + 576n$, and $x^3 - 3x^2z + 2xz^2 = x^3 - xz^2 - 288n$; from hence $x = 6\sqrt[3]{2n}$, $z = 2\sqrt[3]{2n}$, and the dimensions $4\sqrt[3]{2n}$, $6\sqrt[3]{2n}$, $8\sqrt[3]{2n}$, and the content 384 gallons.

Other ingenious solutions were given by Messrs. Bevan, Blackwell, Brexner, Burdon, Coultherd, Craggs, Crosby, Davies, Exbank, Francis, Furnass, E. G. Harrison, Harkes, Haycock, Hartley, Henderson, Henry, Lockwood, W. M. Middleton, Mitchell, Moore, Myers, A. N. Newby, Robinson, Roullicr, Roxbottom, Rowe, Ryley, Scurr, Smith, Squire, Theobren, Truman, Walton, Warkman, Watkins, Wood, Woodbridge, Wright, &c.

IV. SUPP. QUEST. (80), answered by Mr. B. Bevan, Surveyor.

The surface of a dodecaedron is equal to 12 pentagons; and since the sides of similar figures are in a subduplicate ratio of their areas, as $\sqrt{1} : \sqrt{12} :: 16 : 55.4257$ the side required.

The same, by Mr. J. Lockwood, at the Rev. T. Cursham's Academy.

As the side of the dodecaedron is given equal 16, its surface will be found (by prob. 7, sect. 6, Dr. Hutton's Mensur.) = 5283.84 = the area of the pentagon. Now as the area of any regular polygon is found by multiplying the square of its side by its tabular multiplier (see pa. 81 of the same treatise); consequently if the area of any regular polygon be divided by its corresponding tabular multiplier, the root of the quotient must give the side, which in the present case is 55.425 .

The same, by Mr. James Mason, Clapham.

It is evident $\sqrt{16 \times 16 \times 12} = 55.42$ inches = the side of the pentagon whose area = the surface of the dodecaedron.

The same, by Mr. John Surtees.

Let x = side of the pentagon, and $a = \sqrt{1 + \frac{2}{5}} \sqrt{5}$. Then by pages 81 and 407 Hutton's Mensur. the area of the pentagon is $\frac{5}{4}ax^2$, and the area of the dodecaedron $15a \times 16^2$; these put equal, and reduced, give $x = 32\sqrt{3} = 55.425$ inches, the side required.

The same, by Mr. Wm. Watkins, Wylam.

Here, $\sqrt{16^2 \times 12} = 16\sqrt{12} = 55.425626$, the side of the pentagon.

Answers were also given by Messrs. Blackwell, Bosworth, Brewer, Burdon, Coultherd, Craggs, Crosby, Davies, Dover, Evans, Exbank, Francis, Furnass, E. G. Harrison, Hartley, Hawkes, Haycock, Henderson, Henry, Hewitt, Johnson, Jones, Laurent, Middleton, W. M. Moore, Myres, A. N. Newby, Nield, Ramsay, Robinson, Roullier, Rowbottom, Rowe, Ryley, Scurr, Smith, Squire, Thoubren, Truman, Walton, Warkman, Wood, Wooldridge, Wright, &c.

V. SUPPL. QUEST. (81), answered by Messrs. E. G. W. M. and A. N, pupils to Mr. John Howard, Newcastle (since dead).

From the tables for calculating annuities (see Dr. Hutton's Dictionary pa. 29, vol. 2), we find that 10.8l. purchases 1l. for a person of 45 years of age, at the rate of 4 per cent interest of money; therefore by the rule of three, as $10.8 : 1 :: 200 : 18.5185$, or 18l. 10s. $4\frac{1}{2}$ d. nearly, which is the annuity sought.

The same, by Mr. John Haycock, Stanstead, Herts.

I expect there will be great diversity of answers to this question. Thus, by Emerson's Miscellanies, pa. 118, the present worth of 1 pound annuity is 12.68, for the given age and rate; therefore as $12.68 : 1 :: 200 : 15.773 = 15$ l. 15s. $5\frac{1}{2}$ d. the annuity required. But by Simpson's Tables, $200 \div 10.8 = 18.518$. By Price's tables, $200 \div 12.28 = 16.287$. And by Halley's, $200 \div 12.32 = 16.234$.

Thus various other answers were given, from different tables, by Messrs. Bevan, Boulby, Blackwell, Burdon, Johnson, Brewer, Craggs, Crosby, Davis, Evans, Exbank, Francis, Furnass, Har-

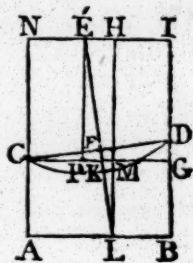
No. 13. Supp. Questions answered. 37

risson, *Hurtley, Henderson, Hewitt, Mason, Middleton, Mitchell, Myres, Newby, Ramsey, Robinson, Roullier, Rosebottom, Rowe, Ryley, Scholfield, Simcock, Smith, Squire, Surtees, Thoubren, Warkman, Watkins, Wood, Wooldridge, Wright, &c.*

VI. SUPPL. QUEST. (82), answered by *Mr. Wm. Burdon, Acaster Malbis.*

Let AC, BD be the heights of the two boys:

join CD, which bisect with the perp. EFL, meeting the ceiling NE in E, representing the point the string was fastened to. Draw CG parallel, and LH perp. to AB. Then, from the similarity of the triangles, CFK, CGD, LMK, LHE; since $DG = \frac{1}{2}$, and $LM = \frac{1}{2}CG$, $KM = \frac{1}{2}DG = \frac{1}{2}$, $CD = \sqrt{CG^2 + DG^2} = \frac{5}{2}\sqrt{13}$, as $CG : CD :: CF : CK = 4\frac{3}{4}$, $CM = NH = CK + KM = 4\frac{5}{4}$, $EH = \frac{1}{2}DG = \frac{1}{2}$, and $NE = NH - EH = 4\frac{3}{4}$. Hence $CE = DE = \sqrt{CN^2 + NE^2} = \frac{5}{24}\sqrt{1105} = 6.92532088$, which is the length of the string, or radius of the sector. Then, by trigonometry, the angle $CED = 81^\circ 12' 9''$. Consequently by rule 2, pr. 11, pa. 37, vol. 2, Dr. Hutton's Course of Mathematics, the area of the sector CED is 33.9858 square feet.



The same, by Mr. W. H. Jones, Cambridge.
This pleasing question may be constructed in the following manner. On $AB = 9$, the given distance of the boys, erect the perpendiculars AC and BD equal to $4\frac{1}{2}$ and 5 respectively; let these be produced till AN and BI are each equal to 10, the height of the room; then may NI represent the top of the room. Bisect CD in F, and erect the perp. FE, which gives the point E where the string was suspended, as it is evident. Then also ECD will be the sector required. For the two sides CF, FE being equal to the two DF, FE, and the included angles at F equal, therefore the third sides CE, DE are also equal.

The radius CE or DE may be most easily found by algebra: thus, put $EN = x$; then $IE = 9 - x$; also $CN = 5\frac{1}{2}$, and $DI = 5$. Now it is evident that $CN^2 + NE^2$ and $DI^2 + EI^2$ are each equal to CE^2 or DE^2 ; hence this equation $5^2 + 9 - x^2 = (5\frac{1}{2})^2 + x^2$, or $106 - 18x + x^2 = 30\frac{1}{4} + x^2$, which properly reduced gives $x = 4\frac{3}{4} = NE$; whence $\sqrt{CN^2 + NE^2} = CE = 6.92532$, the length of the string. The measure of the arc CD may be found by various methods, but perhaps the following is the shortest: By trigon. as $CE : \text{radius} :: CN : \text{sine of } \angle CEN = 52^\circ 34' 42''$, and as $DE : \text{radius} :: DI : \text{sine of } \angle DEI = 46^\circ 13' 8''$; the sum of these two taken from

38 Diary Supplement, 1800.

180° leaves 81° 12' 10" for the angle CED, or the measure of the arc CD. The area of the circle of which CE is radius, is readily found to be 150·67113 : therefore as 360° : 81° 12' 10" :: 150·67113 : 33·98587 feet, the area of the sector CED described by the string.

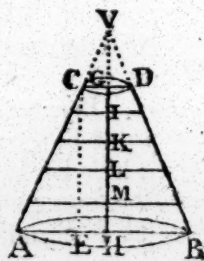
The same, by Mr. Thomas Squire, of Baldock.

In the figure are given AB = CG = 9, BD = 5, AC = 4½, GD = ½, and EP = 5½ by the question. Then (by Eucl. I. 47) $\sqrt{CG^2 + GD^2} = CD = 9·013878$ feet. And by sim. triangles, CG : CD :: EP : EK = 5·508481, and CG : GD :: CF = ½ CD : FK = ·2503855. Therefore EF — FK = EF = 5·2580955. Again, $\sqrt{CF^2 + FE^2} = CE$ or ED = 6·9253207; then as CE : CF :: 1 : ·6507913 = sine of 40° 36' 4½", the double of which is 81° 12' 9" = the angle CED. Hence, by rule 2, pa. 37, vol. 2, Dr. Hutton's new Course of Mathematics, the area of the sector is found = 33·98505769 feet.

Ingenious answers were also given by Messrs. Baker, Bevan, Bosworth, Boulby, Brewer, Coultherd, Craggs, Crosby, Davies, Driver, Evans, Ewbank, Francis, Furnass, E. G. Harrison, Hartley, Hawkes, Haycock, Henderson, Henry, Hewitt, Hunter, Johnson, Laurent, Lockwood, W. M. Mason, Middleton, Mitchell, Moore, Myres, A. N. Newby, Nield, Ramsey, Robinson, Roulhier, Rowbottom, Rowe, Ryley, Scurr, Smith, Surtees, Truman, Virlet, Walton, Warkman, Watkins, Wood, Wooldridge, Wright, &c.
VII. SUPPL. QUEST. (83), *ans. by Mr J. Blackwell, Hungerford.*

Let ABDC represent the given frustum, and the cone completed to V, also the other lines as appear in the figure. Put CD = x, CE = GH = x + 5, and AB = x + 10.

Then, by mensuration, $(x^2 + x + 10)^2 + x \cdot x + 5 \cdot x + 10 \cdot x \cdot 261799 \&c. = 6414·085$, in which equation $x = 15$; therefore CE or GH = 20, and AB = 25; hence AE = 5; then as AE : CE :: AH : VH = 50, therefore VG = 30; hence the content of CVD = 1767·14586, which put = a, and $b = \frac{1}{3} ABDC = 1282·817$; then, by similar cones, as $\sqrt[3]{CVD} : GV ::$



$$\sqrt[3]{\begin{matrix} a+b \\ a+2b \\ a+3b \\ a+4b \\ a+5b \end{matrix}} : \begin{cases} VI = 35·98558 \\ VK = 40·45318 \\ VL = 44·10581 \\ VM = 47·23678 \\ VH = 50·00000 \end{cases} \begin{cases} VI - VG = 5·98558 \\ VK - VI = 4·46760 \\ VL - VK = 3·65263 \\ VM - VL = 3·13097 \\ VH - VM = 2·76322 \end{cases}$$

The last numbers are the heights of the several shares. Now, as 1728 : 10535 :: 1282·817 : 7820·8778 ounces, the weight of each person's share. Therefore, as 10z. : 5s. :: 7820·8778 : 1955l. 4s. 4½d. the value of each share.

The same, by Mr. John Craggs, Hilton.

The solidity of the frustum in 6414·085, and its value

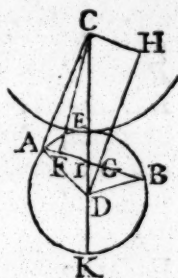
No. 13. Supp. Questions answered. 39

9769l. 12s. therefore each person's share is 1953l. 18s. 4 $\frac{3}{4}$ d. Put now $x = GH$ the frustum's altitude; then $AB = x + 5$, and $CD = x - 5$; hence, by Hutton's Mensur. p. 156, cor. 6, $3x^3 + 25x = 6414.085 \div .2618 = 24500$, where $x = 20$; conseq. $CD = 15$, and $AB = 25$. By sim. tri. $AE : EC :: AH : HV = 50$ the height of the whole cone; also $VG = 30$, and 1767.1458674 is the solidity of CVD. Hence, by the property of similar solids, viz. that they are as the cube of their altitudes, he finds the altitudes of the cones and shares the same as those in the foregoing solution.

Solutions were also given by Messrs. Bezan, Burdon, Coulter, Croshy, Davies, Evans, Exebank, Francis, Furnass, E. G. Harrison, Hartley, Haycock, Henderson, Henry, Hunter, Johnson, W. M. Mason, Middleton, Mitchell, A. N. Newby, Ramsay, Robinson, Rosebottom, Rowe, Ryley, Squire, Surtees, Walton, Warkman, Watkins, Wooldridge, Wright, &c.

VIII. or PRIZE SUPPL. QUESTION (84), answered by Mr. T. S. Evans.

CONSTR. Describe the triangle ABC with the three given lines, viz. $AB = 85$ the distance between the two trees, $AC = 98$, and $AB = 120$, the distances of the two trees from the door at C. With centre C and radius 70 describe an arc to touch which arc at E, describe the circle AEB through the two points A, B. Or, bisect the line AB by the perpendicular HGD, also bisect the angle ACB by the line CED; then the intersection D will be the centre of the garden to pass through the two points A, B.



From C draw CF perp. and CH parallel to AB: then, the three sides being given, we find the perp. $CF = GH = 96.95278$: also AF and FB, then we have $FG = CH = 28.21176$. Now $\sqrt{DG^2 + AG^2} = DA = DE$, and $(DE =) \sqrt{DG^2 + AG^2} + CE = (DC =) \sqrt{DH^2 + HC^2}$, or $\sqrt{(GD + GH)^2 + CH^2}$; where DG is an unknown quantity to be found: squaring both sides and transposing, we have $2EC\sqrt{DG^2 + AG^2} - 2DGH = GH^2 + CH^2 - AG^2 - EC^2$ (all known quantities) $= 3489.4964$; hence $DG = 14.40348$, and DA or $DB = \sqrt{DG^2 + AG^2} = 44.87437$ the radius, and 6326.358 square feet is the area of the garden.

The same, by Mr. Abraham Moore, Northwram.

CONSTR. Take $AB = 85$ the distance between the trees, and with it as a base construct the triangle ABC, with the sides AC and BC the distances that are from the door, 98 and

120. Then bisect the angle C with the indefinite line CK; and from C set off $CI = 70$ the nearest distance from the door to the garden fence. Hence there are given three points, to find the circle that may touch them all.

Calculation. By Hutton's Geom. theor. 83, the segments of the base are in proportion as the adjoining sides, hence $AC + CB : AB :: AC : AI = 38.211 :: CB : BI = 46.789$; and, by theor. 64, $CI^2 = AC \cdot CB - AI \cdot IB$, therof. $CI = 99.8606$, conseq. $EI = 29.8606$. Then as $EI : AI :: BI : IK$, hence $EK = EI + IK = 89.7351$ the diameter; conseq. the area is 6324.34567 .

Ingenuous answers were also given by Messrs. Academicus, Geo. Barrett, B. Bevan, Wm. Burdon, W. Buttermann, Geo. Chapman, Tho. Coultherd, Jos. Coxley, John Craggs, Tho. Crosby, Wm. Davies, Rev. J. Ewbank, J. Farrah, John Featherston, Wm. Francis, jun. Rev. J. Furnass, E. G. A. Glendinning, O. G. Gregory, J. Hartley, Gilb. Henderson, T. Hewitt, John Haycock, Tho. Hornby, Henry Hunter, David Henry, W. M. Wm. Marriott, Jas. Mason, Wm. Middleton, John Mitchell, Jos. Moore, A. N. W. Newby, Tho. Nield, John Ramsay, John Rees, Wm. Robinson, Aug. Roullier, Isaac Roxbottom, Alex. Rowe, John Ryley, Rev. Tho. Scurr, Edw. Smith, John Smith, Rd. Smithson, John Surtees, J. H. Seale, Jas. Thoubren, W. Truman, Virtet, Wm. Watkins, Jas. Wilson, Tho. J. Wood, Jos. Wooldridge, Eliz. Wright, Jos. Youle, &c.

DIARY QUESTIONS ANSWERED.

I. DIARY QUEST, answered by Mr. John Latey, Southmolton.

It is manifest, (Eucl. cor. 8, 6), that if the perp. let fall from the vertical angle to the base, of any plane triangle, be a mean proportional between the segments of the base, that the vertical angle is a right one, as in the present instance. Therefore, make AFG a right angle [*Fig. in the Diary*]; then take $AF : FG :: 5 : 4$, and from A through G draw AB = the given base; lastly draw BC parallel to FG meeting AF produced in C.—Now the triangles AFG, ACB are similar; therof. $AC : CB :: AF : FG :: 5 : 4$; also since ACB is a right angle, and AB the given base, therof. ACB is the triangle required.

The same, by Mr. Jona. Walton, of Nest, Cumberland.

On AB as a diameter describe the semicircle ACB, and take AD to AB as 5^2 to $5^2 + 4^2$; erect. the perp. DC; then draw AC and BC, and ABC will be the required triangle.

For, the angle C being a right one, therefore $CD = \sqrt{AD \cdot DB}$; also $AC = \sqrt{AB \cdot AD}$, and $BC = \sqrt{AB \cdot BD}$; therof. $AC : BC :: \sqrt{AD} : \sqrt{BD}$; but by constr. $AD : AB ::$

No. 13. Diary Questions answered. 41

$5^2 : 5^2 + 4^2$, therof $AD : DB :: 5^2 : 4^2$; conseq. $AC : BC :: \sqrt{AD} : \sqrt{BD} :: 5 : 4$, the given ratio.

H. DIARY QUEST. *ans. by Mr. Tho. Squire, Baldock.*

Let $5x$, $7x$, and $9x =$ the number of vibrations made in one minute; their sum is $21x = 252$, hence $x = 252 \div 21 = 12$; therof. $5x = 60$, $7x = 84$, and $9x = 108$, the lengths of the three pendulums. Then, by the laws of pendulums, $as (\frac{1}{168})^2 : 39\frac{1}{8} :: (\frac{1}{84})^2 : 19.9617 :: (\frac{1}{108})^2 : 12.0756$; therof. the three lengths are $39\frac{1}{8}$, and 19.9617 , and 12.0756 .

The same, by Mr. Joseph Youle, of Warsop.

As $5 + 7 + 9 : 252 :: \left\{ \begin{array}{l} 5 : 60 \\ 7 : 84 \\ 9 : 108 \end{array} \right\}$ the vibrations made by each pendulum.

Hence, the first pendulum vibrating seconds, its length is $39\frac{1}{8}$ inches. And the lengths of pendulums being inversely as the square of the number of vibrations, therefore, as

$84^2 : 60^2 :: 39\frac{1}{8} : 19.96$, length of the 2d pendulum,
 $108^2 : 60^2 :: 39\frac{1}{8} : 12.07$ ditto of the 3d pendulum.

III. DIARY QUEST. *answered by Mr. T. S. Evans.*

Let AB be the cane [*Fig. in the Diary*]; its shadow will be the longest possible when the angle DBC is a right one. Now there is given AB and DC , to find the angle BDA . Let $x = AC$, $a = DC$, $b = AB$; then,

as $a \times x$; rad. (1) :: $b : \sin. \angle D$ or of $\angle ABC$,

and as $b : \text{rad. (1)} :: x : \sin. \angle ABC$,

therof. $ax + x^2 = b^2$; hence $x = 2.310771$, and the angle $BDA = \text{alt. of the sun's upper limb} = 50^\circ 22' 39'' .3$. Then by applying refraction $-47'' .2$, parallax $+ 5'' .5$, semid. $- 15' 56'' .0$, and declination $13^\circ 21' 38''$, we get the latitude of the place $53^\circ 15' 35'' .4$.

IV. DIARY QUEST. *ans. by Mr. Wm. Robinson, London.*

Put $m = .0009\frac{1}{4}$ the multiplier for ale gallons, $l = 40$ the length of the cask, $a = 122$ gallons, $b = 100$, $x + y$ and $x - y$ for the bung and head diameters. Then, by Dr. Hutton's Mensur. $(2. \overline{x + y}^2 + \overline{x - y}^2) \times lm = a$, and

$$(2. \overline{x + y}^2 + \overline{x - y}^2 - \frac{8}{9}y^2) \times lm = b;$$

by subtraction $\frac{8}{9}y^2 \times lm = a - b$, hence $y = 19.277 =$ half the difference of the two diameters; this substituted in the 1st equation gives $x^2 + 12.851x = 727.496227$, and hence $x = 21.301$. Conseq. $x + y = 40.578$, and $x - y = 2.024$ inches, the bung and head diameters required.

The same, by Mr. Thos. Jackson Wood, of Bury.

Put x and $y =$ the bung and head diameters, also $a =$

·00092837. Then, by Dr. Hutton's Mensur. $(2x^2 + y^2) 40a = 122$, and $(2x^2 + y^2 - \frac{2}{3} \sqrt{x-y})^2 40a = 100$; the diff. of these two divided by $16a$, gives

$$\sqrt{x-y}^2 = \frac{1.375}{a}, \text{ or } x-y = \frac{1.1725}{\sqrt{a}}, \text{ and } x = y + \frac{1.1725}{\sqrt{a}};$$

this substituted for x in the 2d equat. gives $120ay^2 + 187.6y\sqrt{a} = 12$, from which is got $y = 2.0208$ the head diam. conseq. $x = 40.5048$ the bung diameter.—These numbers answer the conditions of the question; but, from the unsuitness of the dimensions, I suspect there is some mistake in the data. Should the contents be put 122 and 120, instead of 122 and 100, the diameters by the same process will come out 25 and 36.5 nearly.

V. DIARY QUEST. answered by Mr. John Ramsey.

By spherical trigon. the true central altitude is found to be $56^\circ 36' 49''$; this, $-5''$ (parallax) $+ 38''$ (refraction) $- 15' 45''$ (the sun's semidiameter in apogee according to Flamsted), gives the apparent altitude of the sun's lower limb $= 56^\circ 21' 37''$; also the angle the sun's rays make with the meridian is $= 25^\circ 33' 32''$, and the angle they make with the front of the house is $90^\circ - 25^\circ 33' 32'' - 16^\circ 30' = 47^\circ 56' 28''$; then, by plane trigon. as sine of $56^\circ 21' 37''$: its cosine $:: 6\frac{1}{2} : 4.325$ feet the length of the enlightened part; and as radius : sine of $47^\circ 56' 28'' :: 3\frac{1}{2} : 2.5986$ the breadth of the same: hence $4.325 \times 2.5986 = 11.238945$ square feet, the answer required.

VI. DIARY QUEST. answered by Mr. Rd. Elliot.

Let HO represent the horizon of the place [Fig. in the Diary], Z the zenith, P the pole, and DC part of the equator, which will be a quadrant. Now when the sun is due east, he will be some-where in the quadrant CZ, suppose at the point S, through which draw the quadrant PF. Then, by the question, double the arch CS is equal to the angle SPZ at the pole, or equal to double the arch DF, which is the measure of the same. Put the sine of DF $= x$, and the cosine of the given latitude (or of the angle DCZ) $= c$; then, as DC is a quadrant, x will be the cosine, and $\sqrt{1-x^2}$ the sine of the arch FC, and the tangent of the same will be $\sqrt{1-x^2} \div x$. Again, by spherics, as $c : 1 :: \sqrt{1-x^2} \div x : \sqrt{1-x^2} \div cx = \text{tang. of CS the arch of altitude}$; and by Emerson's Trig. pa. 11, double the tangent of an arch divided by 1 minus the tangent squared, to radius 1, gives

$$\text{the tangent of the double arch, therefore } \frac{x}{\sqrt{1-x^2}} = \frac{2\sqrt{1-x^2} \div cx}{1-x^2 \div c^2x^2}, \text{ which by proper reduction becomes}$$

$\frac{c+1}{c-1}$
the na
to be 7

Put
radius

$\sqrt{1-x}$
 x

from 6

$\sqrt{\frac{1}{2c}}$

Hence
nearly
answer

V

The
sin. 60
which
inches
of each

Let

length
inches

then,

the le

questi

less si

was re

VIII

It h

inches

and t

proca

m the

made

60480

by th

38.85

= .2

ened

nut o

As

No. 13. Diary Questions answered. 43

$c + 1 \cdot x = \sqrt{2c + 1}$, hence $x = \sqrt{2c + 1} \div c + 1 = .8944$ the natural sine of $63^\circ 26'$, and the required time is found to be 7h. 46m. 14sec. in the morning.

The same, by Mr. F. Hewitt, London.

Put s and c for the sine and cosine of the given latitude, radius $= 1$; $x =$ sine of the sun's altitude; then

$\frac{\sqrt{1-x^2}}{x} = \cot.$ of the same, and $\frac{1-2x^2}{2x\sqrt{1-x^2}}$ the same

from 6. As $\frac{\sqrt{1-x^2}}{x} : 1 :: c : \frac{1-2x^2}{2x\sqrt{1-x^2}}$; which gives $x =$

$\sqrt{\frac{1}{2c+2}} = .5258572$, the sine of $31^\circ 43'$ the sun's altitude.

Hence the arch from noon is $63^\circ 26'$ answering to 4h. 14m. nearly, and $sx = .309091 =$ sine of $18^\circ 0'$ the sun's declin. answering to May the 11th.

VII. DIARY QUEST. answered by Mr. John Ramsey.

The 6th part of $16\frac{1}{2}$ feet is 33 inches; and, by trigon. as $\sin. 60^\circ : \sin. 30^\circ :: 5\frac{1}{2}$ inches : 3.1754 inches; the double of which added to, and taken from, 33 inches, gives 39.3508 inches the outer length, and 26.6492 inches the inner length of each side.

The same answered, by Mr. Tho. Torran.

Let ABCD represent the plank [Fig. 1. in the Diary], the length AC $= 198$ inches, and its breadth AB $=$ CD $= 11$ inches; also the angle m or $n = 60^\circ$, and the angle $a = 30^\circ$; then, as $\sin. 60^\circ : 11 :: \sin. 30^\circ : 6.35 = 2mA$. Now put $x =$ the less side, then will $x + 12.7 =$ the greater, and by the question $6x + 38.1 = 198$; hence $x = 26.65$ inches $=$ the less side, and then $x + 12.7 = 39.35$ is the greater side, as was required.

VIII. DIARY QUEST. ans. by Mr. John Smith, Alton Park.

It hath been found by experiment, that a pendulum 39.128 inches long, in our latitude, vibrates 60 times in one minute; and that the lengths of pendulums are to one another reciprocally as the square of the number of their vibrations made in the same space of time. Now there are 604800 vibrations made by a pendulum which beats seconds, in one week, and $604800 + 1800 = 606600$, the vibrations made in one week by the given pendulum. Therefore, as $6066^2 : 6048^2 :: 39.128 : 38.896$, the length of the pendulum. Now $39.128 - 38.896 = .232$ inches, and so much must the pendulum be lengthened to reduce it to keep true time, which will require the nut of the screw to be turned 9.28 revolutions downward.

The same, by Mr. Wm. Watkins, of Wylam Engine.

As $7 \times 24 \times 60 : 30 \times 60 :: 1 \text{ min. or } 60 \text{ sec.} : \frac{5}{28} \text{ sec. more}$

than just per minute. And the lengths of pendulums being reciprocally as the square number or vibrations (see Dr. Hutton's Dictionary, art. Pendulum), therefore as $(60\frac{5}{8})^2 : 60^2 :: 39\frac{1}{3} : 38.89314$ inches, the pendulum's length; which taken from 39.125 , leaves $.23185$ inc. the nut is too high; then $.23185 \times 40 = 9.274$ the revolutions downward.

The same, by Mr. Joseph Youle, of Warsop.

If to the seconds in one week 604800 , be added 1800 , the vibrations made in 30 minutes, we get 606600 the vibrations made in a week; theref. $606600 \div 7 \times 24 \times 60$ gives 60.178 the vibrations in one minute. Now the lengths of pendulums being inversely as the square of the number of vibrations, it will be $60.178^2 : 39\frac{1}{3} :: 60^2 : 38.893$ inches, the pendulum's length; conseq. $39.125 - 38.893 = .232$ inches too long; theref. $1 : 40 :: .232 : 9.28$ the revolutions required.

IX. DIARY QUEST. answered by the Rev. J. Furnass.

Let $CI = x$, $CA = 24 = a$, $AH = AB = 10 = b$, (see the 2d fig. to this quest. in the Diary). Then $a : b :: x : bx \div a = IF$, and $EH = AH - AE = (a - x)b \div a$.

Since, by the laws of falling bodies,* the velocities at I and F are equal, and that the velocity at F will carry it through $2CI$ in the time of falling through CI , and since these are as the square roots of the heights, it will be $\sqrt{CI} : 2CI :: \sqrt{EF} : EH$, that is, $\sqrt{x} : 2x :: \sqrt{a - x} : \frac{ab - bx}{a}$, hence $\frac{ab - bx}{a}$

$\sqrt{x} = 2x\sqrt{a - x}$, and $x = \frac{ab^2}{b^2 + 4a^2} = \frac{600}{601}$. Hence $IF = bx \div a = \frac{25}{601}$, and $CI = \frac{650}{601} = 1.08153$.

The same also, by Mr. Tho. Squire, of Baldock.

Let BCH be the cone, F the hole, CA the axis $= 24 = a$, $AH = AB = 10 = b$, $AI = EF = x$, and $a - x = CI = DF$. Then, by Schol. to prop. 61 pa. 225, of Dr. Hutton's new Course of Mathematics, Vol. II. (supposing the water to spout horizontally at F), as $\sqrt{a - x} : \sqrt{x} :: 2 : a - x : 2\sqrt{x(a - x)}$; and as $a : b :: x : 2\sqrt{x(a - x)}$; theref. $bx = 2a\sqrt{x(a - x)}$; this reduced gives $x = \frac{4a^3}{4a^2 + b^2}$. Hence $CI = a - x = \frac{ab^2}{4a^2 + b^2}$, and as $CA = a (24) : CH = c (26) :: CI = a - x : CF = \frac{cb^2}{4a^2 + b^2} = \frac{650}{601} = 1.0815308$ feet from the vertex.

X. DIARY QUEST. answered by A + B.

Let EF be the line of division, of the triangle ABC , and the other lines as in the fig. [see the last fig. to this quest. in the Diary]. Then $AB : BC + AC :: BC - AC : BD - AD = 2122$; hence $BD = 3436$. Again, $BC : BD :: \sin. \angle D : \sin. \angle BCD = 63^\circ 29'$; then $CAD = 26^\circ 31'$, and its half, or $OBD = 13^\circ 15\frac{1}{2}'$. Again, $\cos. HBD : \sin. D :: BD : BH = 3530$; and as $\sin. D : \sin. HBD :: BH : DH = 809$. Now

No. 13. Diary Questions answered. 45

the area of the given $ABC = 4071683$ square links, which divided by half the sum of the sides, gives the radius OL of the inscribed circle $= 757$. By sim. tri. $DH : BH :: LO : BO = 3305$, the line bisecting the angle B and terminating in the centre of the inscribed circle; which now reduces this question to prob. 72 Simpson's Alg. where we have $EF : BO :: \cos. \frac{1}{2} \angle B : \text{tang. of an angle} = 60^\circ 46'$, the half compl. of which is $= 14^\circ 37'$. Then as $\text{tang. of } 14^\circ 37' : \text{radius} :: \sin. \angle B : \text{cosin. half the diff. of the angles } E \text{ and } F = 28^\circ 30'$, which added and subtracted with their half sum $= 76^\circ 44'$, give $\angle F = 105^\circ 14'$, and $\angle E = 48^\circ 14'$. Again, as $\sin. EF :: \sin. F : BE = 3891$, and $:: \sin. E : BF = 3007$. Now having all the three sides of the triangle BFE , the area is found to be 26ac. 1r. 16p. which taken from the area of the given triangle found above $= 4071683$ square links, or 40ac. 2r. 4p. leaves 14ac. 2r. 18p. for the area of the trapezium $AEFC$.

XI. DIARY QUEST. *ans. by Mr. Da. Kinnebrook, jun.*

The latitude, declination, and hour of the day, being given, the sun's azimuth is found $= 136^\circ 6' 6''$, and true alt. of his centre $= 46^\circ 40' 23''$, from which the apparent alt. of his upper limb is found $= 46^\circ 57'$. Then, in a right-angled triangle, are given the hypoth. $= 80$ fathom $= 480$ feet, and the angle at the base $= 60^\circ$, to find the base $= 240$ feet, and perp. $= 415.69212$ feet, hence the height of the kite above the ground is $415.69212 + 4 + 3 = 422.69212$ feet; also in another right-angled triangle are given the perp. 422.69212 , and angle at the base $= 46^\circ 57'$ the sun's alt. to find the base $= 394.85709$ feet. Now let NS be a north and south line [see 1st. fig. in the Diary], D the place of the boy, B the place on the ground directly under the kite, and C the extremity of the shadow; then in the oblique angled triangle CD , are given $BD = 240$, $BC = 394.85709$, and the $\angle DBC = \text{supp. } (\angle DBS + \angle CBN) = 113^\circ 36' 6''$, to find $CD = 537.95248$ feet, the distance sought.

II. DIARY QUEST. *ans. by Mr. John Houlgate, at Mr. Leming's School, at Horsforth, near Leeds.*

First, 4 chains $= 88$ yards, 1ch. $= 22$ yds. 6 feet $= 2$ yds. 1 foot $= 1 \frac{1}{2}$ yd: then $(2^2 + 1^2) \div 1 = 5$ ch. $= 110$ feet the diameter of the plantation, and 114 the diam. to the outside of the ditch; then $114 + 110 \times 114 - 110 \times .7854 \times 1 \frac{1}{2} = 55.5776$ the solid content of the ditch, which at 2d. per yard, comes to 8l. 15s. 11.1552d. Again, $110 + 2 = 112$ the diam. of a circle inscribed in the middle of the ditch, and $112 \times 3.1416 = 351.8592$ the circumf. which at 6d. per yard comes to the same as above.

The same, by Mr. Samuel Smith, of Kirkley.

The square of half the chord divided by the versed sine, gives 4, to which the versed sine added, gives 5 chains $= 330$ for the diam. of the plantation, also $330 + 12 = 342$ the

diam. to the outside of the ditch; then $342 + 330 = 672$ the sum of the diameters, and $342 - 330 = 12$ the diff. of the diameters; and, admitting the ditch to be as wide at bottom as at top, its solid content will be $67 \times 12 \times .7854 \times 4\frac{1}{2} = 28500.5952$ cubic feet $= 1055.5776$ cubic yards, which, at 2d. a yard, amounts to $\cdot 796481$. Again, $330 + 3 + 3 = 336$ the diam. and $336 \times 3.1416 \div 3 = 351.8592$ yards, the circumf. in the middle of the ditch, which, at 6d. a yard, amounts to 8.796481 . the same as the other.

The same, by Mr. Tho. Swanwick, Derby.

As this quest. does not require the value of the work, but whether is the most advantageous contract for the owner, there is no necessity for finding the length of the arc. And as the medium arc, taken along the middle of the ditch, multiplied by the breadth and depth, gives the true solidity; and as this arc is also the measure by which the other contract is to be valued; we need only find the value of a single yard in length of each, and this will answer the question. First then, 1yd. mean circumf. $= 6d$, and $1 \times 2 \times 1\frac{1}{2} = 3$ yds. solid measure, at 2d. per yard $= 6d$. also. Cons. there is no preference.

XIII. DIARY QUEST. *ans. by Mr. Alex. Rowe, Regimus.*

The ball's solidity is $= 4^3 \times .5236 = 33.5104$ cubic inches, and its weight $= 9$ lb. therof. $11 + 9 = 20$ the copper and iron together, and $60 - 20 = 40$ the weight of water. Now put the depth $= x$, then the inside diameter $= 2x$, and the vessel's capacity, $4x^3 \times .7854 = 33.5104 + 40 \times 1728 \div 62\frac{1}{2} = 1139.4304$, or $x^3 = 1139.4304 \div 3.1416$, and $x = \sqrt[3]{1139.4304 \div 3.1416} = 7.1315$ the depth, hence $2x = 14.263$ the diameter.

Now put $a = 7.1315$ the depth, and $c = 1139.4304$ the content, also the thickness of copper $= y$; then $a + y =$ the external depth, and $2a + 2y =$ the exterior diameter. Hence $(2a + 2y)^2 \times .7854 \times (a + y) - c = 11 \div 3.17166$, hence $a + y = 7.2013$, and $y = 7.2013 - a = 7.2013 - 7.1315 = .0698$ the thickness of copper.

XIV. DIARY QUEST. *ans. by Mr. Wm. Robinson, London.*

The centre of gravity of a very small sector of the grinding stone is known to be at $\frac{2}{3}$ of the radius from the centre. Now let $r = 1\frac{1}{2}$ the radius of the stone, $t = 60 \div 750 = \frac{2}{25}$ sec. the time of one revolution, $g = 16\frac{1}{12}$ feet, and $c = 3.1416$; then, by Dr. Hutton's Dict. $5 \times \frac{2}{3} r \times 2c^2 \div gl^2 = 958.8$ cwt. is the force required.

The same, by Mr. John Surtees, Wearmouth.

Let $r = 1\frac{1}{2}$ feet, the radius of the stone, $t = \frac{2}{25}$ sec. the time of one revolution, $g = 16\frac{1}{12}$, $c = 3.1416$, and $x =$ any variable dist. from the centre. Then $(2x + 2r)^2 \times \frac{1}{4}c - cx^2 = 2cxx + crr$, or $2cxx$ only $=$ the flux. of a ring or annulus, and $10xx \div r^2 =$ moment of its weight; then by Dr. Hutton's

Dict.
annul
3gl²r
centri

Sin
2.121
put d
s = 1
we h
stone
XV.

An
cles o
radius
since
= AV
— AH
= ha
Ag
VO a
struct
Con
the co
equal
any
and e
the tr

I.
Ag
200 c
to ha
each
it is c
agree

On
farth
138°

A
reque
garden
one f
50, 6
37 5
expe

Dict. vol. I. pa. 261, the moment of the centrif. force of the annulus is $20c^2x^2 \div gt^2x^2$, the fluent of which is $20c^2x^3 \div 3gt^2r^2$, and when $x = r$, $20c^2r \div 3gt^2 = 958.8$ cwt. is the centrif. force required.

The same, by Mr. Geo. Taylor, of Butterley Park.

Since 3 feet, the diam. of the stone, mult. by $\sqrt{\frac{1}{2}}$ gives 2.12148 feet, the diam. of the circle of gyration, for which put d , and $t = .08$ sec. the time of one revolution of the stone, $s = 16\frac{1}{12}$, $q = 3.1416$, and $f =$ the force; by central forces we have $f = dq^2 \div st^2 = 203.48$ times the weight of the stone, = 50.87 tons, the tendency it has to burst.

XV. or DIARY PRIZE QUEST. *ans. by Mr. John Surtees, Wearmouth.*

Analysis. Suppose the thing done, AB, VAr, and VBv circles of equal curvature and convexity, OC or OD or OE the radius of the inscribed circle, and VPv perp. to AB. Then, since BC = BE, and AC = AD, VE = VD = BV — BC = AV — AC = $\frac{1}{2}(AV — AP) + \frac{1}{2}(BV — BP)$, CP = $\frac{1}{2}(AV — AP) — \frac{1}{2}(BV — BP)$, and $\angle D$ or $\angle E = 180^\circ — \angle D$ or $\angle E =$ half the perim. of the tri. VAB, are all given.

Again, since the $\angle EVO$ is given, and $\angle E$ a right angle, VO and VE or VD are also given. Hence the following construction.

Constr. Having described the circles CDE and MVM, with the centre O and radii OD and OV, describe a circle BCA of equal curvature and convexity with VA and VB to touch it in any point C; lay off CP = $\frac{1}{2}(AV — AP) — \frac{1}{2}(BV — BP)$, and erect the perp. PV; this will cut MM in V the vertex of the triangle required.

NEW QUESTIONS.

I. QUEST. (85), *by Mr. John Warkman, of Weardale.*

A gentleman, desirous of having a rectangular box, to hold 200 oranges, the diameter of each being 2 inches; he wishes to have the depth 8 inches, and the length and breadth, when each is squared, those squares to make together a sum of 500: it is desired to know what the length and breadth must be, to agree with the gentleman's plan?

II. QUEST. (86), *by A + B.*

On looking at my watch, I observed it was past nine; and farther, that the hour and minute hands made an angle of 138° ; required the time?

III. QUEST. (87), *by Philom. Eber.*

A young gentleman, who had just learned surveying, was requested by his father to tell him the area of his triangular garden. "Tommy," says he, "you see here are three walks (viz. one from each corner, to the statue within) which are in length 50, 60, and 70 yards; and the three angles of the garden are $37^\circ 50'$, 77° , and $65^\circ 10'$, respectively. From these data, I expect you will be able to find the sides and area."—Tommy,

48 Diary Supplement, 1800.

however, after studying some time, confessed it was above his pitch, and he therefore wishes some of the ingenious Diary correspondents to favour him with a resolution of his difficulties.

IV. QUEST. (88), *by Mr. Wm. Watkins, Wylam Engine.*

A whimsical old fellow, an acquaintance of mine, has a triangular field, the sides of which he says are a , b , c chains; now he wants a gravel walk made directly from the angle opposite the shortest side, and to terminate in it, so that as he marches along from the angle to that side, the area on his left-hand side, may be to that on his right, as 5 to 3. Query the length of the walk?

V. QUEST. (89), *by Mr. Alex. Rowe, Reginnis.*

To determinate the time and velocity of a body descending, by the force of gravity, down the side of a conical mountain, whose perpendicular altitude is $\frac{1}{4}$ of a mile, and the semidiameter of the base is $\frac{2}{5}$ of a mile?

VI. QUEST. (90), *by Mr. Wm. Burdon, Acaster Malbis.*

A person intends to raise a pillar, of a circular base, of 60 inches diameter, on a plane which makes an angle of 20° above the horizon. Query what length it will bear before it overset, supposing the slant side to make an angle of 85° with the diameter of its base?

VII. QUEST. (91), *by Mr. John Rees, Bristol.*

The shadow's of St. Peter's tower, Carmarthen, was 123.2722 feet, when the sun was due west, and his coaltitude double his altitude. Query the time, and the height of the tower, the latitude being $51^\circ 52'$ north?

VIII. or PRIZE QUEST. (92), *by Mr. O. G. Gregory, Cambridge.*
(Whoever answers it before Feb. 2, has a chance by lot for 10 Supplements.

The altitude of a vessel, in form of a square pyramid, is 4 feet, and each side of its base measures 6 feet: if this vessel be fixed with its vertex downward, and filled with water, it is required to determine the whole pressure of the fluid on its internal superficies; also, how much water must be taken out, so that the pressure of the remainder on the surface which it covers, shall be equal to the eighth part of the pressure before determined?

N. B. Mr. Gregory has lately published a new and improved edition of his ingenious *Lessons on Astronomy*.

* * The Prize of 10 Supplements for the solution of the Prize Question has fallen to the lot of Mr. John Ramsay; and the other Prize of 10 Supplements also, for the solution of the Enigmas, Rebuses, Queries, &c. to Miss Eliz. Wright; who will please to send some person to call for them in their name at the Publisher's, in London.

FINIS.

is
pr-
.

a
s ;
le
as
is
ry

g,
n,
ia-

60
ve
et,
ia-

ras
de
he

ge.
10

s 4
sel
it
its
ut,
it
ore

ved

ixe
her
as,
ase
ub-